STANDARD LAB

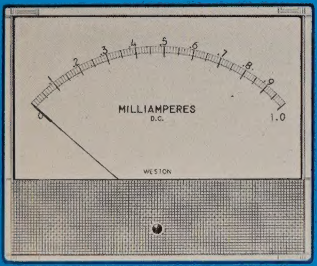
WESTON®

prime source
for precision...
since 1888

WESTON INSTRUMENTS, INC.
a Schlumberger company

STANDARD LAB

WESTON®


MILLIAMPERES
D.C.
0
1
2
3
4
5
6
7
8
9
1.0
WESTON

WESTON
MILLIVOLTS D.C.
±1999

WESTON
1240
+1990
V-Ω
COM
mA
OFF
DC
AC
V-Ω
mA
mA
V

Stock Panel Meters / Portable Instruments

TABLE OF CONTENTS

PANEL METERS

1½″ DC and AC Meters 4
2½″ DC and AC Meters 5, 6, 7
3½″ DC and AC Meters 8, 9, 10, 11
4½″ DC and AC Meters 12, 13
5½″ DC and AC Meters 14
7½″ DC Meters 14
Edgewise Meters 21
Optical Ribbon Indicators 21, 22
Digital Panel Meters 23, 24, 25
Optical Meters 15, 16
Illumination Kits (1900 Series) 20
% Load Meters 17
Mounting Bezels (1900 Series) 20
Null Meters 17
Leads 18
Shunts 18
Transformers 19
Tubular Resistors 19
Volume Level (VU) Meters 17

PORTABLE INSTRUMENTS

A-C & D-C Instruments — Models 911, 912 37
Bench Testers — Models 2930, 2931, 2932, 2934 39
Clamp Ammeter — Model 633 36
Clamp Volt-Ammeter — Models 633, 749 36
Industrial Analyzer — Model 639 35
Industrial Circuit Tester — Model 785 35

Industrial Class Portables

901/ Group (¼% and ½%) 32
931/433 Group (½%) 30, 31
622 Group (½%) 33

Laboratory Class Portable Standards

AC/DC Transfer Ammeter Standard — Model 370 34
AC/DC Transfer Voltmeter Standard — Model 341 34

Light Measuring Instruments

Foot-Candle Meter — Model 614 39
Foot-Lambert Meter — Model 759 40
Illumination Meter — Model 756 40

Sightmeter — Model 703 40
Sunlight Illumination Meter — Model 756 40

Multimeters

Digital Multimeters 27, 28
Battery Pack Model 9740 29
Industrial Analyzer — Model 779 36
Multi-Range Analyzer — Models 80, 81, 82 38
Volt-Ohm Milliammeter — Model 980 37

Shunts & Transformers

Current Transformers — Models 327, 461, 539 41
Portable Testing Shunts — Model 9992 41

ORDERING INFORMATION— PANEL METERS

- **Select model number, size and style.**
- **Specify the case style you prefer:**
    - Round or Square in the 201/301 Series
    - Plastic or Phenolic in the 1900 Series (1910 Series 1½″) Plastic front only.
    - ½ Frame Bezel Mounting in the 1900 Series, described on page 20.
    - Illumination if desired in the 1900 Series, described on page 20.
    - Optical meters — Specify horizontal or vertical mounting.
- **Specify magnetic or non-magnetic panel mounting when required, and give panel material and thickness.**
- **Ask for the Accessories you will need:**
    - AC Transformers on page 19.
    - DC Shunts on page 18.
    - Tubular Resistors on page 19.

ORDERING INFORMATION— PORTABLE INSTRUMENTS

To insure proper handling of your order, be sure to state range(s) of each instrument and include the 7 digit catalog number along with the model number.

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SPECIFICATIONS—WESTON PANEL METERS

	Function and Mechanism	Standard Accuracy	Scale Length	Case F		Ranges Page
1½"	DC CORMAG	±2%	1.25"	Plastic	111	4
	AC Rect. CORMAG	±3%	1.25"	Plastic	112	4
	Rect. Ext. Magnet	±3%	1.37"	Plastic	1912	4
2½"	DC CORMAG	±2%	1.875"	Plastic	121	5
	AC Rect. CORMAG	±3%	1.875"	Plastic	122	5,6
	DC CORMAG*	±2%	1.57"	Phenolic, Sq. or Rd.	201	5,6
	AC Iron Vane	±2%	1.57"	Phenolic, Sq. or Rd.	204•	6,7
	DC Ext. Magnet	±2%	1.57"	Phenolic, Sq. or Rd.	206•	6,7
	DC CORMAG	±2%	2.3"	Plastic or Phenolic	1921	5,6
	AC Rect. CORMAG	±3%**	2.3"	Plastic or Phenolic	1922	7
	AC Iron Vane	±2%	2.3"	Plastic or Phenolic	1924•	7
	DC Ext. Magnet (Ruggedized)♦	±2%	1.75"	Metal, Rd.	2521	5,6
	AC Iron Vane (Ruggedized)♦	±2%	1.75"	Metal, Rd.	2524	7
3½"	DC CORMAG	±2%	2.75"	Plastic	131	8,9,10
	AC Rect. CORMAG	±3%	2.75"	Plastic	132	11
	DC CORMAG	±2%	2.36"	Phenolic, Sq. or Rd.	301	8,9,10
	AC Rect. Type	±3%**	2.36"	Phenolic, Sq. or Rd.	302	11
	AC Iron Vane	±2%	2.13"	Phenolic, Sq. or Rd.	304•	11
	DC Ext. Magnet	±2%	2.36"	Phenolic, Sq. or Rd.	306•	10
	Thermo Ext. Magnet	±2%	2.36"	Phenolic, Sq. or Rd.	308•	11
	DC CORMAG	±2%	2.5"	Plastic or Phenolic	531	8,9,10
	AC Rect. CORMAG	±3%	2.5"	Plastic or Phenolic	532	11
	AC Iron Vane	±2%	2.7"	Plastic or Phenolic	1934•	11
	DC Ext. Magnet	±2%	2.7"	Plastic or Phenolic	1936•	10
	DC Ext. Magnet (Ruggedized)♦	±2%	2.4"	Metal, Rd.	2531	8,9,10
	AC Iron Vane (Ruggedized)♦	±2%	2.4"	Metal, Rd.	2534	11
4½"	DC CORMAG	±2%*	3.9"	Plastic or Phenolic	1941	12,13
	AC Rect. CORMAG	±2%**	3.9"	Plastic or Phenolic	1942	13
	AC Iron Vane	±2%	3.9"	Plastic or Phenolic	1944•	13
	DC Ext. Magnet	±1%*†	3.9"	Plastic or Phenolic	1946•	12
5½"	DC CORMAG	±1%*	4.7"	Plastic or Phenolic	1951	14
	AC Iron Vane	±2%	4.7"	Plastic or Phenolic	1954•	14
	DC Ext. Magnet	±1%†	4.7"	Plastic or Phenolic	1956•	14
7½"	DC CORMAG	±1%†	7.2"	Plastic	1971	14
OPTICAL	DC CORMAG	±1%††	4.5"	Phenolic	1201	16
	AC Rect. CORMAG	±2%	4.5"	Phenolic	1202	16
	DC CORMAG	±1%	8.0"	Phenolic	1209	15
	DC CORMAG	1±%	30.0"	Phenolic	1236	15

* Knife-edge pointer and mirror scale supplied with 1% accuracy.

** On sine wave 60 cycle source at 25°C.

† ½% accuracy available with knife edge pointer and mirror scale on special order.

†† ½% accuracy available on special order.

• External Magnet and AC Iron Vane Models must be adjusted for magnetic panel mounting when required. Specify panel material and thickness.

◇ Meets MIL-M-10304 specification.

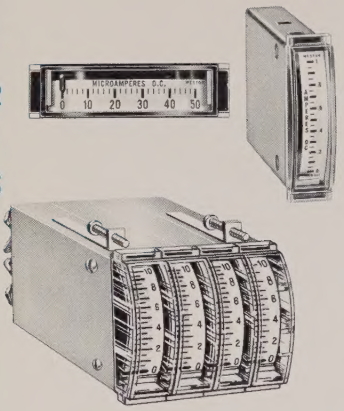
NOTE: Unless otherwise stated scales will have white background with black figures and division lines.

CORMAG® Self-shielding core magnet moving coil mechanism.

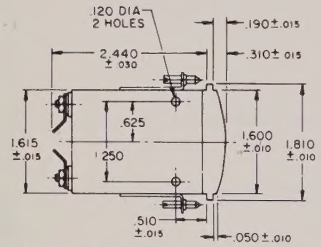
Digital Panel Meters—See page 22, 23, 24, for specifications.

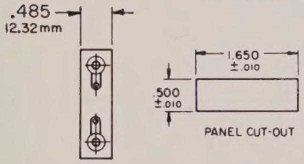
WESTON

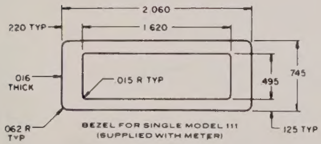
SEE
BACK
OF
COVER
FLAP
FOR
SPECS


MICROAMPERES D.C.
0 10 20 30 40 50

111 SERIES


.120 DIA
2 HOLES
.190±.015
2.440 ±.030
.310±.015
.625
1.615 ±.015
1.250
1.600 ±.010
1.810 ±.010
.510 ±.015
.050±.010


.485
12.32mm
1.650 ±.010
.500 ±.010
PANEL CUT-OUT


2.060
1.620
.220 TYP
.016 THICK
.015 R TYP
.495
.745
.062 R TYP
.125 TYP

BEZEL FOR SINGLE MODEL 111
(SUPPLIED WITH METER)

BEZEL FOR MOUNTING 2 MODELS 111
SIDE-BY-SIDE (ORDER SEPARATELY)

1½" DC and AC METERS

1½" DC VOLTMETERS

MODEL→	111 (2%)			
RANGE	Resis.	Catalog Number		
2	↑ 5000 Ohms Per Volt ↓	—		
5		—		
10		1921010*		
15		—		
25		1921025		
30		—		
50		1921050		
100		1921100		
150		1921150*		
300		1921300		

1½" DC AMMETERS

MODEL→	111 (2%) *Self-contained*			
RANGE	Resis.	Catalog Number		
1	.05	2921001*		
2	—	—		
5	—	—		
10	—	—		

1½" DC MILLIAMMETERS

MODEL→	111 (2%)			
RANGE	Resis.	Catalog Number		
1	39	4921001*		
5	5.2	4921005		
10	2	4921010*		
20	—	—		
25	2	4921025		
50	—	—		
100	.5	4921100		
150	.33	4921150		
250	.20	4921250		
500	.10	4921500		

1½" DC MICROAMMETERS

MODEL→	111 (2%)			
RANGE	Resis.	Catalog Number		
50	2300	5921050*		
100	900	5921100*		
200	600	5921200*		
500	125	5921500		
50-0-50	900	5921750*		
25-0-25	—	—		

1½" AC VOLTMETERS

MODEL→	112 (3%) *Rect. Type*		1912 (3%) *Rect. Type Plastic Front Only*	
RANGE	Resis.	Catalog Number	Resis.	Catalog Number
150	2000Ω/v	1931150*	2000Ω/v	1821150
300	2000Ω/v	1931300	2000Ω/v	1821300

*Stocked Horizontal and Vertical

Note: All Resistance Values Are Approximate.

DC and AC METERS

2½″ DC VOLTMETERS

MODEL→	121-125		201				1921		2521 *(Ruggedized)*	
RANGE	Resis.	Catalog Number	Resis.	Catalog Number			Resis.	Catalog Number	Resis.	Catalog Number
1.5	5000 Ohms Per Volt	—	1000 Ohms Per Volt	1301114			1000 Ohms Per Volt	—	1000 Ohms Per Volt	—
2		—		—				—		—
3		—		1301101				—		—
5		—		—				1621005		—
8		—		—				—		—
10		1921010		—				1621010		1101001
15		—		1301104				1621015		—
20		—		—				—		—
25		1921025		1301117				1621025		—
30		—		1301105				1621030		—
50		1921050		1301106				1621050		1101002
100		1921100								—
150		1921150		1301108				1621150		—
200		—		—				1621200		—
250		—		—				—		—
300		1921300		1301111						1101005
500		—		1301112				1621500		—

2½″ DC AMMETERS

	121-125		201				1921		2521 *Ruggedized)*	
MODEL→ RANGE	Resis.	Catalog Number	Resis.	Catalog Number			Resis.	Catalog Number	Resis.	Catalog Number
1	.05	2921001	Approx. 50 mv Drop	2301101			Approx *50 mv Drop	2621001	Approx. 50 mv Drop	—
1.5	—	—		2301102				—		—
2	—	—		2301109				2621002		—
3	—	—		2301103				—		—
5	—	—		2301104				2621005		2101001
10	—	—		2301105				2621010		2101002
15	—	—		2301106				—		—
20	—	—		2301107						—
25	—	—		—				—		—
30	—	—		2301108				2621030		—
50	—	—		2301110				—		—
100	—	—		2303101*				2621100*		—
200	—	—		2303103*				—		—
300	—	—		2303104*				—		—
500	—	—		2303105*				—		—

*Calibrated for use with 50 mv shunts and .065 ohm leads (see page 18).

2½″ DC MILLIAMMETERS

MODEL→	121-125		201			
RANGE	Resis.	Catalog Number	Resis.	Catalog Number		
1	39	4921001*	100	4301101		
2	—	—				
5	5.2	4921005	6	4301102		
10	2	4921010	2.5	4301103		
15	—	—	—	—		
20	—	—	—	—		
25	2	4921025	—	—		
30	—	—				
50	—	—	2	4301107		
100	5	4921100	1	4301108		
150	.33	4921150				
200	—	—	—	—		
250	.20	4921250	—	—		
300	—	—	—	—		
500	.10	4921500	0.2	4301110		
1-0-1	—	—	40	4301111		
100-0-100	—	—	1	4301112		

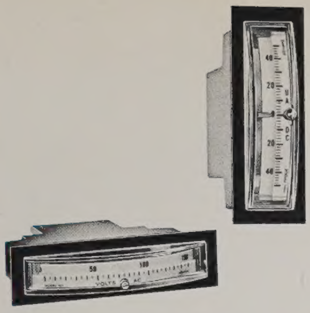
Continued on Next Page

*Stocked Horizontal and Vertical (same price)

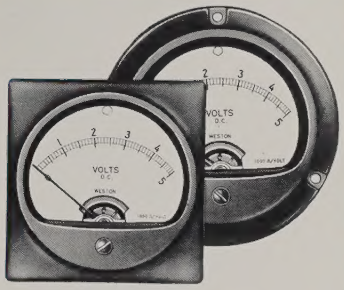
Note: All Resistance Values Are Approximate.

All 1900 series instruments listed are with Bakelite Fronts. If plastic fronts are desired, use same catalog number, but change 2nd catalog number digit from 6 to 8.

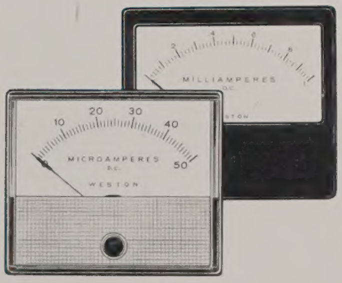
All meters are stock items. Any other practical range can be supplied.



121 SERIES

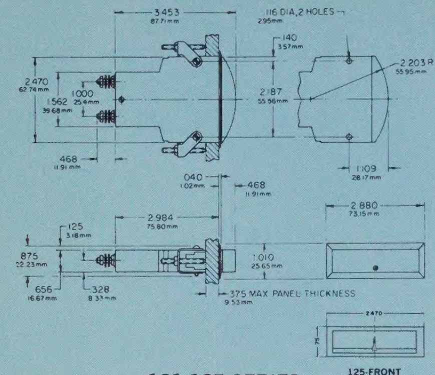


201 SERIES

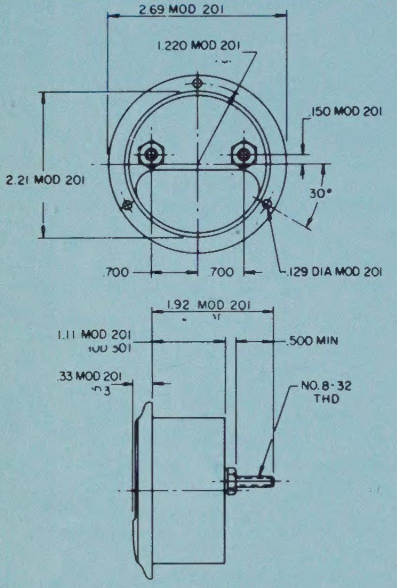


1920 SERIES

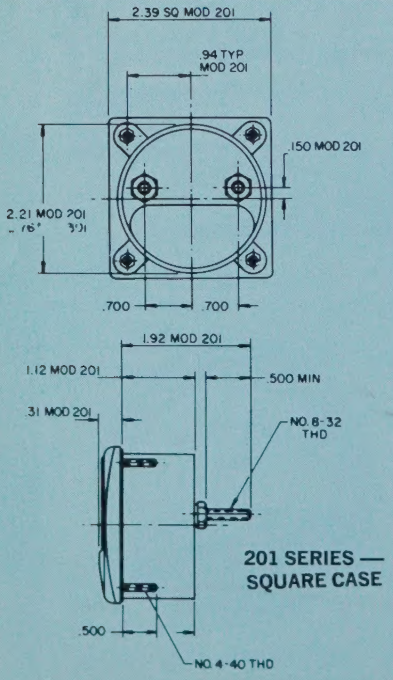
2520 SERIES *(Ruggedized)*
see next page for dimensions


3.453
87.71mm
.116 DIA, 2 HOLES
2.95mm
.140
3.57mm
2.203 R
55.95mm
2.470
62.74mm
1.000
25.4mm
1.562
39.68mm
2.187
55.56mm
.468
11.91mm
1.109
28.17mm
.040
1.02mm
.468
11.91mm
2.880
73.15mm
2.984
75.80mm
.125
3.18mm
.875
22.23mm
1.010
25.65mm
.656
16.67mm
.328
8.33mm
.375 MAX PANEL THICKNESS
9.53mm
2.470
125-FRONT

121-125 SERIES


2.69 MOD 201
1.220 MOD 201
.150 MOD 201
2.21 MOD 201
30°
.700
.700
.129 DIA MOD 201
1.92 MOD 201
1.11 MOD 201
.500 MIN
.33 MOD 201
NO. 8-32 THD

201 SERIES — ROUND CASE


2.39 SQ MOD 201
.94 TYP MOD 201
.150 MOD 201
2.21 MOD 201
.700
.700
1.92 MOD 201
1.12 MOD 201
.500 MIN
.31 MOD 201
NO. 8-32 THD
.500
NO. 4-40 THD

201 SERIES — SQUARE CASE

2½" DC MILLIAMMETERS (Con't)

MODEL→	1921 *Pivot & Jewel*		1921 T *Taut Band*		2521 *(Ruggedized)*	
RANGE	Resis.	Cat. No.	Resis.	Cat. No.	Resis.	Cat. No.
1	88	4621001	34.5	4829001	95	4101001
2	45		—	—	—	—
5	8.5		—	—	—	—
10	2.5	4621010	—	—	—	—
15	—	—	—	—	—	—
20	2.2		—	—	—	—
25	—	—	—	—	—	—
30	—	—	—	—	—	—
50	2.0	4622050	—	—	—	—
100	1.0	4622100	—	—	—	—
150	—	—	—	—	—	—
200	0.5	4622200	—	—	0.25	—
250	—	—	—	—	—	—
300	0.33	4622300	—	—	—	—
500	0.2	4622500	—	—	—	—
1-0-1	—	—	14.3		—	—
100-0-100	—	—	—	—	—	—

2½" DC MICROAMMETERS (more below)

MODEL→	121-125		201		206			
RANGE	Resis.	Catalog Number	Resis.	Catalog Number	Resis.	Catalog Number		
20	—	—	—	—				
50	2300	5921050*	4150	5301101				
100	900	5921100*	870	5301102				
200	600	5921200	600	5301103	—	—		
500	134	5921500	160	5301104	—	—		
25-0-25	—	—	4150		—	—		
50-0-50	900	5921750*	870	5301106	—	—		
100-0-100	—	—	600	5301107	—	—		
500-0-500	—	—	—	—	—	—		

2½" DC MICROAMMETERS (Con't.)

MODEL→	1921 Pivot & Jewel		1921 T *Taut Band*		2521 *(Ruggedized)*	
RANGE	Resis.	Cat. No.	Resis.	Cat. No.	Resis.	Cat. No.
20	—	—	—	—	3000	5101001
50	4800	5621050	1950	5829050	1175	5101002
100	1225	5621100	538	5829100	1000	5102001
200	600	5621200	—	—	600	5102002
500	240	5621500	—	—	—	—
25-0-25	—	—	—	—	—	—
50-0-50	1225	5621850	538	5829850	1000	5102003
100-0-100	600	5621710	—	—	—	—
500-0-500			—	—	—	—

2½" AC VOLTMETERS

MODEL→	122-127		204 *(Iron Vane)* *25-125 cps*			
RANGE	Resis.	Catalog Number	Resis.	Catalog Number		
3	—	—	—	—		
5	—	—	26			
7.5	—	—	—	—		
10	—	—	100	1301103		
15	—	—	250	1301106		
25	—	—	—	—		
30	—	—	—	—		
75	—	—	5074	1301114		
100	—	—	10,065	1301115		
150	2000Ω/v	1931150	20,295	1301101		
300	2000Ω/v	1931300	81,550	1301104		
500	—	—	—	—		

*Stocked Horizontal and Vertical (same price)

Continued on Next Page

Note: All Resistance Values Are Approximate.

2½" AC VOLTMETERS (Con't.)

MODEL →	1922 *Rect. Type*		1924 *(Iron Vane) 25-125 cps*		2524 *(Iron Vane) Ruggedized*	
RANGE	Resis.	Catalog Number	Resis.	Catalog Number	Pwr. Cons.	Catalog Number
3	1000 Ohms Per Volt	—	6	1621003	—	—
5		1621005	—	—	—	—
7.5		—	37	1621975	—	—
10		—	66.5	1621010	—	—
15		1621015	150	1621015	—	—
25		—	500	1621025	—	—
50		—	1665	1621050	—	—
75		—	3750	1621075	—	—
100		—	—	—	2 va max.	—
150		1621150	15,000	1621150		1101002*
300		1621300	60,000	1621300	2 va max.	1101004*
500		—	100,000	1621500		—

* 150 Volts AC (400 Hz) . . . Cat No. 1101003; 300 Volts AC (400 Hz) . . . .Cat No. 1101005

2½" AC AMMETERS

MODEL →	204 *(Iron Vane) 25-500 cps*				1924 *(Iron Vane) 25-500 cps*		2524 *(Iron Vane) Ruggedized, 25-125 cps*	
RANGE	Resis.	Cat. No.			Resis.	Cat. No.	Resis.	Cat. No.
1	.130	2301104			.25	2621001	—	—
2					.062	2621002	—	—
3					.025	2621003	—	—
5	.005	2301101			.016	2621005	.016	2101002
10	.0014	2301107			.0045	2621010	—	—
15	.0015	2301102			.0025	2621015	—	—
20	.0005	2301108			.0011	2621020	—	—
25					—	—	—	—
30	.0004	2301109			.00056	2621030	—	—
50	.0002	2301103			.00027	2621050	—	—
100*	—	—			.016	2622100	—	—
200*	—	—			.016	2622200	—	—

* 5 ampere range for use with current transformer . . . see page 19.

2½" AC MILLIAMMETERS

MODEL →			1922 *(Rect. Type)*		1924 *(Iron Vane)*	
RANGE			Resis.	Cat. No.	Resis.	Cat. No.
1			475	4621001	—	—
10			—	—	2550	4621010
100			—	—	25	4621100
200			—	—	6.33	4621200
500			—	—	1.0	4621500

2½" AC MICROAMMETERS

MODEL →	1922 *(Rect. Type)*							
RANGE	Resis.	Cat. No.	RANGE	Resis.	Cat. No.	RANGE	Resis.	Cat. No.
100	4000	5621100	200	2000	5621200	500	800	5621500

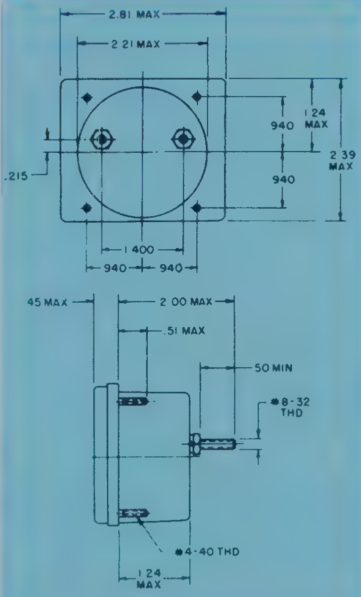
All 1900 series instruments listed are with Bakelite Fronts. If plastic fronts are desired, use same catalog number, but change 2nd catalog number digit from 6 to 8.

All meters are stock items. Any other practical range can be supplied.

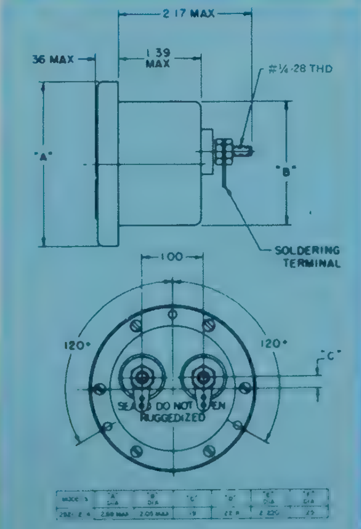
Note: All Resistance Values Are Approximate.

GENERAL DIMENSIONS

(ALL DIMENSIONS ARE APPROXIMATE)


2.81 MAX
2 21 MAX
1 24 MAX
940
2 39 MAX
.215
940
1 400
940
940
45 MAX
2 00 MAX
.51 MAX
50 MIN
#8-32 THD
#4-40 THD
1 24 MAX

1920 SERIES

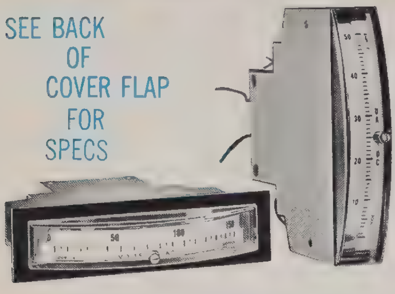

2 17 MAX
36 MAX
1 39 MAX
#¼-28 THD
"A"
"B"
SOLDERING TERMINAL
100
120°
120°
"C"
SEALED DO NOT OPEN RUGGEDIZED

2520 SERIES *(Ruggedized)*

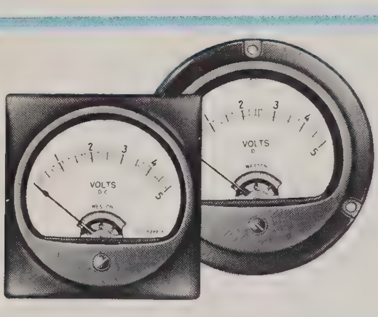
WESTON

3½" DC and AC METERS

SEE BACK
OF
COVER FLAP
FOR
SPECS



131 SERIES



301 SERIES

3½" DC VOLTMETERS (more below)

MODEL→	131		301			
RANGE	Resis.	Catalog Number	Resis.	Catalog Number		
1.5	5000 Ohms Per Volt	—	1000 Ohms Per Volt	1301114		
2		—		—		
3		—		1301104		
5		—		1301101		
8		—		1301105		
10		1921010		1301106		
15		—		1301107		
25		1921025		—		
30		—		1301108		
50		1921050		1301102		
100		1921100		1301111		
150		1921150		1301112		
200		—		1301113		
250		—		—		
300		1921300		1301103		
500		—		1301115		
1 kv		—				

3½" DC VOLTMETERS (Con't.)

MODEL→	1931 *Pivot & Jewel*		1931 T *Taut Band*		2531 *Ruggedized*	
RANGE	Resis.	Cat. No.	Resis.	Cat. No.	Resis.	Cat. No.
1.5	1000 Ohms Per Volt	—	1000 Ohms Per Volt	—	1000 Ohms Per Volt	—
2				—		—
3		—		—		—
5		1621005		—		—
8		—		—		—
10		1621010		—		—
15		1621015		1629015		—
25		1621025		—		—
30		1621030		1629030		—
50		1621050		1629050		1101001
100		1621100		1629100		—
150		1621150		1629150		—
200		—		—		—
250		—		—		—
300		1621300		—		—
500		1621500		1629500		—
1 kv		—		—		—

MILLIAMPERES
DC

1930 SERIES

30
60
90
120
150

2530 SERIES *(Ruggedized)*

All 1900 series instruments listed are with Bakelite Fronts. If plastic fronts are desired, use same catalog number, but change 2nd catalog number digit from 6 to 8.

SEE PAGE 20 FOR MOUNTING BEZELS
AND ILLUMINATION KITS.

Note: All Resistance Values Are Approximate.

3½″ DC AMMETERS (more below)

MODEL→	131		301			
RANGE	Resis.	Catalog Number	Resis.	Catalog Number		
1	0.05	2921001	Approx. 50 mv Drop	2301101		
1.5	—	—		2301105		
2	—	—		2301102		
3	—	—		2301103		
5	—	—		2301104		
8	—	—		—		
10	—	—		2301106		
15	—	—		2301107		
20	—	—		2301114		
25	—	—		—		
30	—	—		2301108		
50	—	—		2302101		
75	—	—		2303107*		
100	—	—		2303101*		
150	—	—		2303105*		
200	—	—		2303102*		
300	—	—		2303103*		
500	—	—		2303104*		
10-0-10	—	—		2301110		
30-0-30	—	—		2301113		
50-0-50	—	—		2302102		

*Calibrated for use with 50 mv shunts and .065 ohm leads (see page 18).

3½″ DC AMMETERS (Con't.)

MODEL→	1931 *Pivot & Jewel*		1931 T *Taut Band*		2531 *Ruggedized*	
RANGE	Resis.	Cat. No.	Resis.	Cat. No.	Resis.	Cat. No.
1	Approx. 50 mv Drop	2621001	Approx. 50 mv Drop	2629001	—	—
1.5		—		—	—	—
2		2621002			—	—
3		—		—	—	—
5		2621005		2629005	0.01	2101001
8		—		—	—	—
10		2621010		2619010	—	—
15		—		—	—	—
20*					—	—
25				—	—	—
30		2621030		2629030	—	—
50*		—		—	—	—
75*		—		—	—	—
100*				—	—	—
150*		—		—	—	—
200*				—	—	—
300*				—	—	—
500*		2621500*		—	—	—
10-0-10		—		—	—	—
30-0-30		—		—	—	—
50-0-50		—		—	—	—

*Calibrated for use with 50 mv shunts and .065 ohm leads (see page 18).

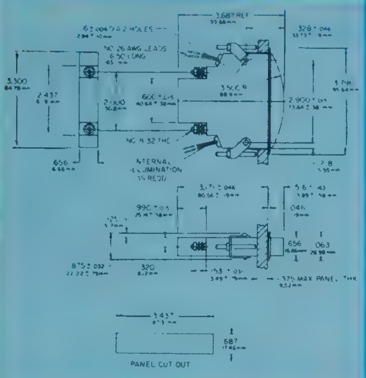
All 1900 series instruments listed are with Bakelite Fronts. If plastic fronts are desired, use same catalog number, but change 2nd catalog number digit from 6 to 8.

All meters are stock items. Any other practical range can be supplied.

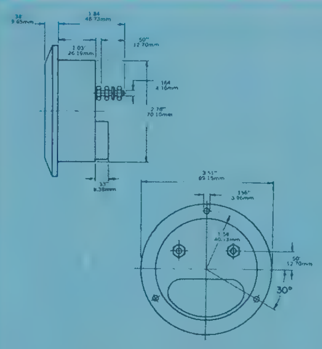
Note: All Resistance Values Are Approximate.

GENERAL DIMENSIONS

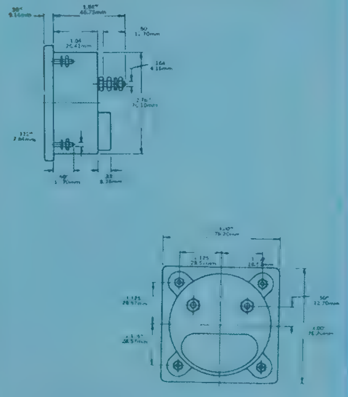
(ALL DIMENSIONS ARE APPROXIMATE)



131 SERIES



301 SERIES — ROUND CASE



301 SERIES — SQUARE CASE

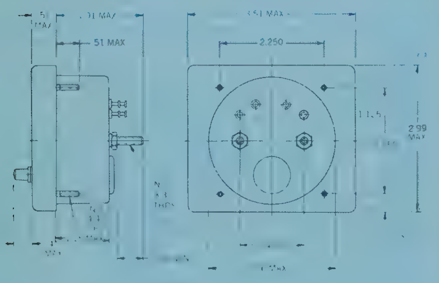
WESTON

3½″ DC and AC METERS

SEE
BACK
OF
COVER
FLAP
FOR
SPECS

3½″ DC MILLIAMMETERS

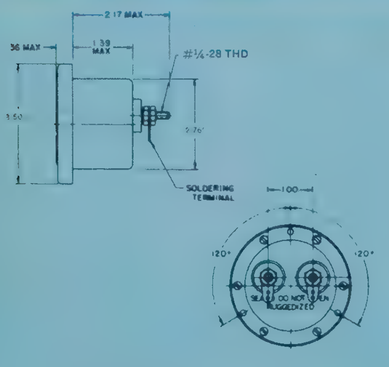
MODEL→	131		301				1931 *Pivot & Jewel*		1931 T *Taut Band*		2531 *Ruggedized*	
RANGE	Resis.	Catalog Number	Resis.	Catalog Number			Resis.	Catalog Number	Resis.	Catalog Number	Resis.	Catalog Number
1	38	4921001*	27	4301111			88	4621001	34.5	4629001	95	4101001
1	—	—	88	4301101			—	—	—	—	—	—
1.5	—	—	88	4301104			—	—	—	—	—	—
2	—	—	45	4301105					—	—	—	—
3	—	—	45	4301106			—	—	—	—	—	—
5	5.2	4921005	8	4301107			8.5	4621005	3.3	4629005	—	—
10	2.3	4921010	2.5				2.5	4621010	—	—	2.7	4101002
15	—	—	2.5	4301102			—	—	—	—	—	—
20	—	—	2.5	4301109			2.2	4621020	—	—	—	—
25	2.0	4921025	2.5	—			—	—	—	—	—	—
30	—	—	2.5	4301103			—	—	—	—	—	—
50	—	—	2	4302101			2.0	4622050	1	4628050	—	—
100	0.5	4921100	1	4302102			1.0	4622100	—	—	—	—
150	0.33	4921150	0.66	4302107			—	—	—	—	—	—
200	—	—	0.5	4302103			0.5	4622200			—	—
250	0.2	4921250	—	—			—	—	—	—	—	—
300	—	—	0.33	4302108			0.33	4622300	—	—	—	—
500	0.1	4921500	0.2	4302104			0.2	4622500			—	—
1-0-1	—	—	45	4301110			—	—	—	—	—	—
10-0-10	—	—	2.5	4301112			—	—	—	—	—	—
50-0-50	—	—	2	4302110			—	—	—	—	—	—
100-0-100	—	—	1	4302106			—	—	—	—	—	—



1930 SERIES

3½″ DC MICROAMMETERS (more below)

MODEL→	131		301		306			
RANGE	Resis.	Catalog Number	Resis.	Catalog Number	Resis.	Catalog Number		
20	—	—	5500	5301107††	1480	5301104††		
30	—	—	5500	5301108††	—	—		
50	2300	5921050*	4800	5301104	1175	5301107		
100	900	5921100*	1230	5301101	660	5301102		
200	600	5921200	600	5301105	55	5301101		
500	134	5921500	230	5301106	—	—		
10-0-10	—	—	5500	5301110	—	—		
25-0-25	—	—	4800	5301111	—	—		
50-0-50	900	5921750*	1230	5301109	—	—		
100-0-100	—	—	600	5301102	—	—		
500-0-500	—	—	88	5301103	—	—		



2530 SERIES *(Ruggedized)*

3½″ DC MICROAMMETERS (Con't.)

MODEL→	1931 *Pivot & Jewel*		1931 T *Taut Band*		1936 T *Taut Band*		2531 *Ruggedized*	
RANGE	Resis.	Cat. No.	Resis.	Cat. No.	Resis.	Cat. No.	Resis.	Cat. No.
5	—	—	—	—	13,500	5629005	—	—
10	—	—	—	—	5,300	5629010	—	—
20	—	—	—	—	2,100	5629020	3000	5101001
50	4800	5621050	1950	5629050	—	—	1175	5101002
100	1225	5621100	538	5629100	—	—	1000	5102001
200	600	5621200	440	5629200	—	—	600	5102002
500	240	5621500	—	—	—	—	—	—
50-0-50	1225	5621850	—	—	—	—	985	5102004
100-0-100	600	5621710	—	—	—	—	—	—
500-0-500			—	—	—	—	—	—

*Available from stock in both Horizontal and Vertical (same price).

††Recommended for use in horizontal position.

All 1900 series instruments listed are with Bakelite Fronts. If plastic fronts are desired, use same catalog number, but change 2nd catalog number digit from 6 to 8.

Note: All Resistance Values Are Approximate.

3½″ AC METERS

3½″ AC VOLTMETERS

MODEL→	132 (Rect. Type)		302 (Rect. Type)		304 (Iron Vane) 25-125 cps		304 (Iron Vane) 400 cps				1932 (Rect. Type)		1934 (Iron Vane) 25-125 cps		2534 (Iron Vane) Ruggedized 25-125 cps	
RANGE	Resis.	Catalog Number	Resis.	Catalog Number	Resis.	Catalog Number	Resis.	Catalog Number			Resis.	Catalog Number	Resis.	Catalog Number	Pwr. Cons.	Catalog Number
1	—	—	1000 Ohms Per Volt	1302102‡	—	—	—	—			1000 Ohms Per Volt	—	—	—	—	—
1.5	—	—		—	3	1301102	—	—				—	—	—	—	—
3	—	—		—	15	1301103	—	—				—	6	1621003	—	—
5	—	—			26	1301104	—	—				1621005	—	—	—	—
7.5	—	—		—	—	—	—	—				—	37	1621975	—	—
10	—	—		1301103	100	1301106	—	—				1621010	66.5	1621010	—	—
15	—	—			250	1301107	—	—				1621015	150	1621015	—	—
25	—	—		—	—	—	—	—				—	500	1621025	—	—
30	—	—		1301105	790	1301108						—	—	—	—	—
50	—	—			2124	1301110	—	—				—	1665	1621050	—	—
75	—	—		—	—	—	—	—				—	—	—	—	—
100	—	—		1301107	10,065	1301111	—	—				—	—	—	—	—
130	—	—		—	13,065	1301112	9412	1301113				—	—	—	—	—
150	2000 Ω/v	1931150		1301108	20,295	1301101	15,565	1301114				1621150	15,000	1621150	2 va max.	1101002*
300	2000 Ω/v	1931300		1301109	81,550	1301115	42,295	1301116				—	60,000	1621300	2 va max.	1101004
500	—	—		—	131,550	1301117	—	—				—	—	—	—	—

*150 Volts AC (400 cps). . . . 1101003

‡2000 ohms per volt.

All 1900 series instruments listed are with Bakelite Fronts. If plastic fronts are desired, use same catalog number, but change 2nd catalog number digit from 6 to 8.

3½″ AC AMMETERS

MODEL→	304 Iron Vane 25-500 cps		308 Thermo Standard Scale		308 Thermo Expanded Scale		1934 Iron Vane		2534 Iron Vane Ruggedized	
RANGE	Resis.	Cat. No.	Resis.	Cat. No.	Resis.	Cat. No.	Resis.	Cat. No.	Pwr. Cons.	Cat. No.
1	0.130	2301102	—	2301101	—	2302101	.25	2621001	—	—
1.5	0.055	2301103	—	—	—	—	—	—	—	—
2	0.026	2301104	—	—	—	—	.062	2621002	—	—
3	0.013	2301105	—	2301104	—	2302102	.025	2621003	—	—
5	0.005	2301101	—	2301105	—	2302103	.016	2622005	2 va max.	2101002
8	—	—	—	2301106	—	2302104	—	—	—	—
10	0.0014	2301107	—	2301107	—	2302109	.0045	2622010	—	—
15	0.0015	2301108	—	2301108	—	2302110	.0025	2622015	—	—
20	0.0005	2301109	—	—	—	2302111	.0011	2622020	—	—
25	—	—	—	—	—	—	.0011	2622025	—	—
30	0.0004	2301110	—	—	—	—	.00056	2622030	—	—
50	0.0002	2301111	—	—	—	—	.00027	2622050	—	—
100*	0.005	2301112	—	—	—	—	.016	2622100	—	—
200*	0.005	2301113	—	—	—	—	.016	2622200	—	—
300*	0.005	2301114	—	—	—	—	.016	2622300	—	—

*5 ampere range for use with current transformer . . . see page 19.

3½″ AC MILLIAMMETERS

MODEL→	302 (Rect. Type)		304 (Iron Vane)		1934 (Iron Vane)	
RANGE	Resis.	Cat. No.	Resis.	Cat. No.	Resis.	Cat. No.
0.5	—	—	—	—	—	—
1	470	4301101	—	—	—	—
2	—	—	—	—	—	—
5	150	4301103	—	—	—	—
10	—	—	—	—	2550	4621010
50	—	—	34	4301102	100	4621050
100	—	—	8.5	4301103	25	4621100
250	—	—	—	—	4.0	4621250
500	—	—	0.42	4301101	1.0	4621500

3½″ AC MICROAMMETERS

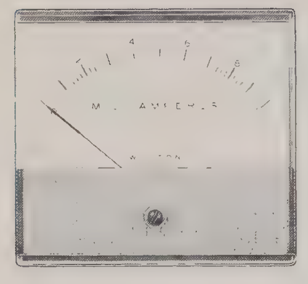
MODEL→	302	
RANGE	Resis.	Cat. No.
100	3400	5301101

Note: All Resistance Values Are Approximate.

All meters are stock items. Any other practical range can be supplied.

4½" DC and AC METERS

SEE BACK OF COVER FLAP FOR SPECS

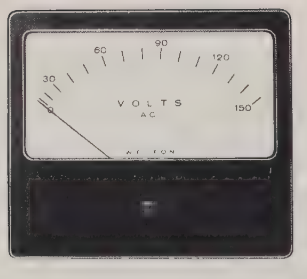


1940 SERIES — PLASTIC FRONT

4½" DC VOLTMETERS

MODEL→	1941 (2%) *Pivot & Jewel*		1941 T (2%) *Taut Band*		1941 T (1%)† *Taut Band*	
RANGE	Resis.	Cat. No.	Resis.	Cat. No.	Resis.	Cat. No.
2	↑	—	↑		↑	1819002
5		1621005		—		
10		1621010		—		1819010
15		1621015				1819015
25	1000	1621025	1000	—	1000	—
30	Ohms	1621030	Ohms	1629030	Ohms	1819030
50	Per	1621050	Per	1629050	Per	1819050
100	Volt	1621100	Volt		Volt	
150		1621150				1819150
200		—		—		
300		1621300				
500	↓		↓	—	↓	1819500

† 1% accuracy supplied with knife edge pointer and mirror scale.



1940 SERIES — PHENOLIC FRONT

4½" DC AMMETERS

MODEL→	1941 (2%) *Pivot & Jewel*		1941 T (2%) *Taut Band*		1941 T (1%)† *Taut Band*	
RANGE	Resis.	Cat. No.	Resis.	Cat. No.	Resis.	Cat. No.
1	↑	2621001	↑	2629001	↑	
2		2621002				
5		2621005		2629005		2819005
10	Approx.	2621010	Approx.		Approx.	2819010
20	50 mv		50 mv	—	50 mv	2819020
25	Drop	2621025	Drop	—	Drop	—
30		2621030				—
100*		2621100		—		—
200*	↓	2621200	↓	—	↓	—

* Use with external shunts and .065 ohm leads . . . see page 18.
† 1% accuracy supplied with knife edge pointer and mirror scale.

10
20
30
40
50
MICROAMPERES
D.C.
WESTON

1940 SERIES ½ BEZEL

SEE PAGE 20 FOR MOUNTING BEZELS AND ILLUMINATION KITS.

4½" DC MICROAMMETERS

MODEL→	1941 (2%) *Pivot & Jewel*		1946 (1%)† *Pivot & Jewel*		1941 T (2%) (1%) *Taut Band*			1946 T (1%)† *Taut Band*	
RANGE	Resis.	Cat. No.	Resis.	Cat. No.	Resis.	Cat. No. 2%	Cat. No. 1%†	Resis.	Cat. No.
5	—	—	—	—	—	—	—	13,500	5629005*
10	—	—	—	—	—	—	—	5,300	5629010*
20	—	—	5400	5621020*	—	—	—	2,100	5629020*
50	2500	5621050	2180	5611050	950	5629050	—	870	5619050
100	2500	5621100	870	5611100	950	5629100	5819100	320	5619100
200	850	5621200	—	—	350	5629200	5819200	—	—
500	240	5621500	—	—	40	5629500	5819500	—	—
25-0-25	2500	5621825	—	—	—	—	—	—	—
50-0-50	2500	5621850	—	—	—	—	—	—	—
100-0-100	850	5621710	—	—	—	—	—	—	—
500-0-500	115	5621750	—	—	—	—	—	—	—

* 2% accuracy
† 1% accuracy supplied with knife edge pointer and mirror scale.

All 1900 series instruments listed are with Bakelite Fronts. If plastic fronts are desired, use same catalog number, but change 2nd catalog number digit from 6 to 8.

Note: All Resistance Values Are Approximate.

4½" DC MILLIAMMETERS

MODEL→	1941 (2%) *Pivot & Jewel*		1941 T (2%) *Taut Band*		1941 T (1%)† *Taut Band*	
RANGE	**Resis.**	**Cat. No.**	**Resis.**	**Cat. No.**	**Resis.**	**Cat. No.**
1	115	4621001	12.5	4629001	12.5	4819001
5	11	4621005	3.0	4629005	3.0	4819005
10			—	—	2.4	4819010
15	2.7	4621015	—	—	—	—
20			—	—	2.4	4819020
50	2	4622050	2	4628050	2	4818050
100			—	—	1	4818100
200	0.5	4622200	—	—	0.5	4818200
300	0.33	4622300	—	—	—	—
500	0.2	4622500	0.2	4628500	0.2	4818500

† 1% accuracy supplied with knife edge pointer and mirror scale.

4½" AC VOLTMETERS

MODEL→	1942 *Rect. Type*		1944 *(Iron Vane) 25-125 cps*	
RANGE	**Resis.**	**Cat. No.**	**Resis.**	**Cat. No.**
3	1000 Ohms Per Volt	—	10.5	1621003
5		1621005	—	—
7.5		—	35	1621975
10		1621010	66.5	1621010
15		—	143	1621015
25		—	500	1621025
30		—	560	1621030
50		—	1665	1621050
100		—	6700	1621100
150		1621150	14,300	1621150
300		—	56,000	1621300
500		—	93,500	1621500

4½" AC AMMETERS

MODEL→	1944 *(Iron Vane) 25-500 cps*	
RANGE	**Resis.**	**Cat. No.**
1	.25	2621001
2	.062	2621002
5	.016	2622005
10	.0045	2622010
20	.0011	2622020
25	.0011	2622025
30	.00056	2622030
50	.00027	2622050
100*	.016	2622100

* 5 ampere range for use with current transformer . . . see page 19.

4½" AC MILLIAMMETERS

MODEL→	1944 *(Iron Vane) 25-500 cps*	
RANGE	**Resis.**	**Cat. No.**
10	2550	4621010
50	100	4621050
200	6.33	4621200
500	1.0	4621500

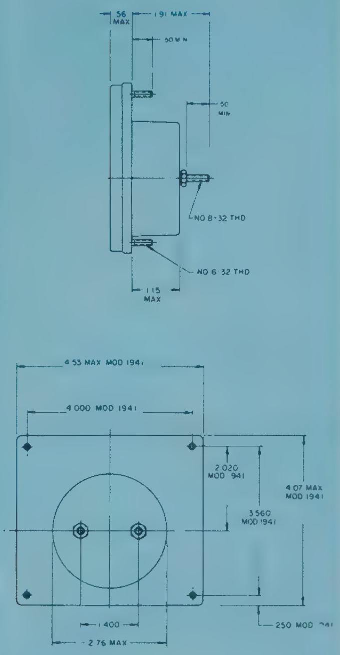
All 1900 series instruments listed are with Bakelite Fronts. If plastic fronts are desired, use same catalog number, but change 2nd catalog number digit from 6 to 8.

All meters are stock items. Any other practical range can be supplied.

Note: All Resistance Values Are Approximate.

GENERAL DIMENSIONS

(ALL DIMENSIONS ARE APPROXIMATE)



1940 SERIES

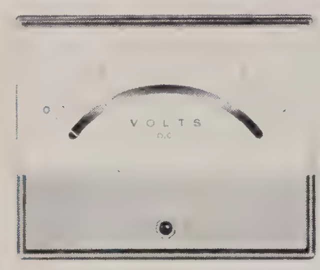
4½"

SEE PAGE 20 FOR MOUNTING BEZELS AND ILLUMINATION KITS

WESTON

SEE BACK OF COVER FLAP FOR SPECS

5½" DC and AC METERS



1950 SERIES — PLASTIC FRONT

(See page 20 for Mounting Bezels and Illumination Kits)

5½" DC VOLTMETERS

MODEL→	1951 T (1%)† *Taut Band*	
RANGE	**Resis.**	**Cat. No.**
5	1000 Ohms Per Volt	—
15		1619015
30		
50		
150		

5½" DC AMMETERS

MODEL→	1951 (2%) *Pivot & Jewel*	
RANGE	**Resis.**	**Cat. No.**
1	115	4829001

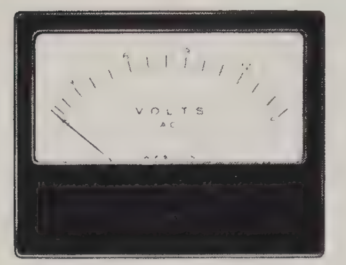
5½" DC MILLIAMMETERS

MODEL→	1951 T (1%)† *Taut Band*	
RANGE	**Resis.**	**Cat. No.**
1	12.5	4619001

5½" DC MICROAMMETERS

MODEL→	1951 T (1%)† *Taut Band*		1956 T (2%) *Taut Band*	
RANGE	**Resis.**	**Price**	**Resis.**	**Cat. No.**
5	—	—		
10	—	—	5,300	5629010
20	—	—		
100	950	5619100	—	—
200	350	5619200	—	—

† 1% accuracy suppled with knife edge pointer and mirror scale.



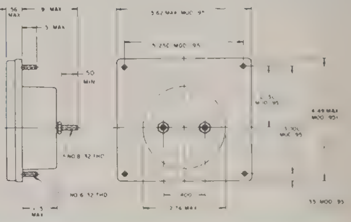
1950 SERIES—PHENOLIC FRONT

5½" AC VOLTMETERS

MODEL→	1954 (2%) (Iron Vane)* *25-125 cps*	
RANGE	**Resis.**	**Cat. No.**
3	10.5	1621003
30	560	1621030
150	14,300	1621150
300	56,000	1621300

5½" AC AMMETERS

MODEL→	1954 (2%) *25-500 cps*	
RANGE	**Resis.**	**Cat. No.**
1	.25	2621001
5	.016	2622005

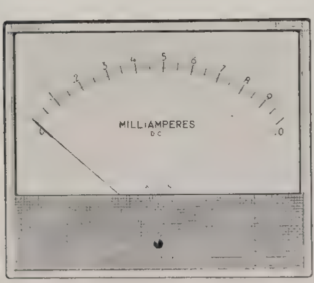


7½" DC METERS

TYPICAL 1971 1% Accuracy
½ BEZEL

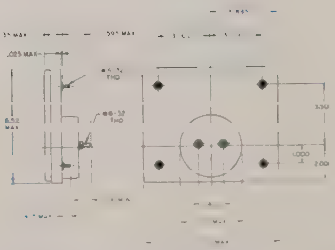
7½" DC MICROAMMETERS

MODEL→	1971 (1%) *Pivot & Jewel*		1971 T (2%)	
RANGE	**Resis.**	**Cat. No.**	**Resis.**	**Cat. No.**
50	—	—	1850	5669050
100	4650	5661002	—	—
200	2000	5661003	—	—



7½" DC MILLIAMMETERS

MODEL→	1971 T (1%) *Taut Band*	
RANGE	**Resis.**	**Cat. No.**
1	95	4669001

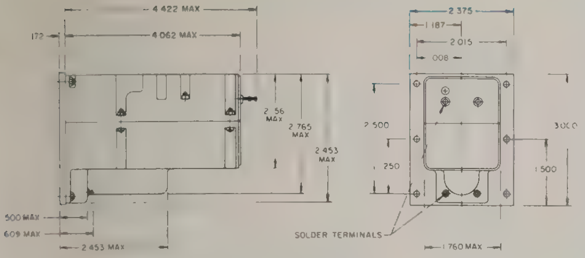


All 1900 series instruments listed, except 1971, are with Bakelite Fronts. If plastic fronts are desired, use same catalog number, but change 2nd catalog number digit from 6 to 8.

Note: All Resistance Values Are Approximate.

OPTICAL METERS

1209 SERIES (8″ of Scale into 2½″ Front) Projected Moving Scale Meter



4 422 MAX
4 062 MAX
.172
2 56 MAX
2 765 MAX
2 453 MAX
500 MAX
609 MAX
2 453 MAX
2 375
1 187
2 015
008
2 500
3 000
250
1 500
SOLDER TERMINALS
1 760 MAX

DC VOLTMETERS

MODEL→	1209 (1%)	
RANGE	Resis.	Cat. No.
50 MV	5 Ohms	9912050
1		
2		
5		
10	1000 Ohms Per Volt	1911010
20		
50		
100		1911100
200		
500		

DC MICROAMMETERS

MODEL→	1209 (1%)	
RANGE	Resis.	Cat. No.
50	5700	5912050
100	1160	5912100
200	231	5912200
50-0-50	1160	5912003

MILLIAMPERES
WESTON

Standard meters use black background scales with white figures. White background scales available.

DC MILLIAMMETERS

MODEL→	1209 (1%)	
RANGE	Resis.	Cat. No.
1	21	4912001

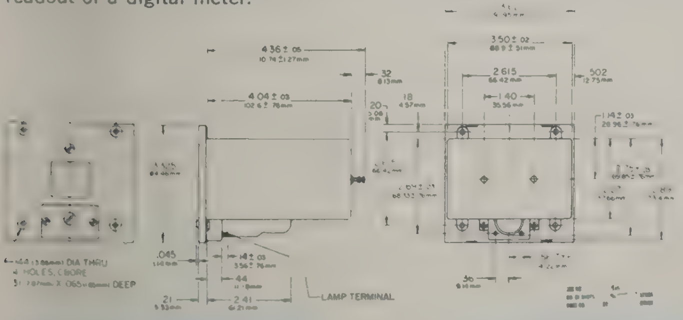
HOW THE PMS MODEL 1209 WORKS
A simple optical system projects a moving scale onto a coated window. The scale is rotated by a self-shielded Weston Cormag mechanism of proved design and reliability. Pivot roll is eliminated in PMS panel meters, because the mechanical axis is vertical.

1236 SERIES (30″ of Scale into 3¾″ Front)

Projected Moving Scale Meter

In a case which is only 3½″ high, 3¾″ wide, 4½″ deep an optical system projects a scale which is effectively 30″ in length. Rather than projecting a few figures and many divisions as is common in panel meters, the 30″ scale has 100 sets of digits, each set representing a reading of 1% of full scale accuracy. ■ The 30″ projected scale has a vertical analog motion which, in effect, provides the appearance and readout of a digital meter.

MICROAMPERES
DC
WESTON



4 36 ± 05
4 04 ± 03
32
18
20
3 50 ± 02
2 615
1 40
502
1 14 ± 03
.045
14 ± 03
44
2 41
21
LAMP TERMINAL
DIA THRU 4 HOLES C'BORE
DEEP

DC MILLIAMMETERS

MODEL→	1236 (1%)	
RANGE	Resis.	Cat. No.
1	180	4911001

DC MICROAMMETERS

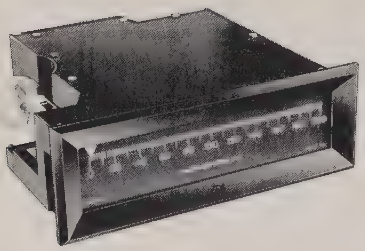
MODEL→	1236 (1%)	
RANGE	Resis.	Cat. No.
100	6000	5911100

All meters are stock items. Any other practical range can be supplied.

Note: All Resistance Values Are Approximate.

OPTICAL METERS (Con't)

1201 SERIES (Projected Moving Pointer)

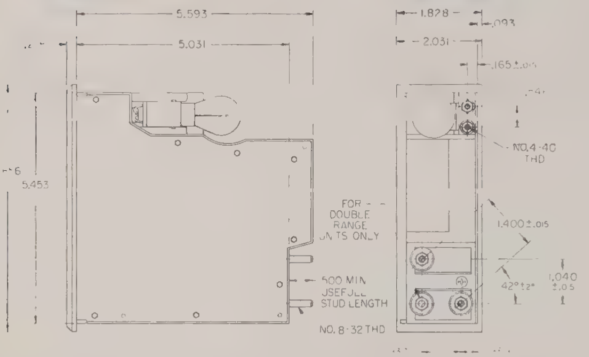


DC VOLTMETERS

MODEL→	1201 (1%)	
RANGE	Resis.	Cat. No.
	↑	—
	1000	
10	Ohms	1911010
20	Per Volt	1911020
50		1911050
	↓	—

DC MILLIAMMETERS

MODEL→	1201 (1%)	
RANGE	Resis.	PCat. No. .)
1	18.8	4911001
10	2.3	4911010
20	5.0	4911020
50	2.0	4911050



DC MICROAMMETERS

MODEL→	1201 (1%)		1206 T *Taut Band*	
RANGE	Resis.	Price (Hor.)	Resis.	Cat. No.
10	—	—	1850	5929010*
20	—	—	—	—
50	2300	5911050	—	—
100	640	5911100	—	—
200	415	5911200	—	—
			—	—
50-0-50	640	5911750	—	—

*Stocked Vertical only.

DC AMMETERS

MODEL→	1 1201 (1%)	
RANGE	Resis.	Cat. No.
5	.01	2911005

Model 1201 is a true flat edgewise instrument with the projection path so arranged that an essentially linear scale is obtained. The standard projected pointer will appear white but can be colored on special order. ■ Since the pointer is projected on the same plane as the scale divisions, parallax is completely eliminated.

The thermosetting plastic case, glass optics, glass window, and rugged 15,000 hour lamp assure trouble free service plus all the advantages of a flat scale. This meter can be used to measure various functions through the use of standard Weston transducers and therefore will find many applications on industrial switchboards as well as electronic equipment. The choice of either horizontal or vertical mounting leaves the designer free to choose the best style for his needs. ■ CORMAG® mechanism is inherently self-shielding; metal covers shield the external magnet mechanism. These units will be unaffected by panel material, normal magnetic fields created by current carrying conductors and can be mounted side-by-side with no loss of accuracy.

Special Feature: Filters may be placed behind the scale so that the pointer will change color at a fixed point.

YOU CAN DEPEND ON YOUR LOCAL DISTRIBUTOR FOR...

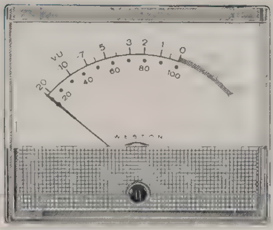
- *INSTANT OFF-THE-SHELF DELIVERY*
- *IN DEPTH INVENTORIES*
- *PROMPT SERVICE*
- *AVAILABILITY OF THE NEWEST MODELS*

Contact your local distributor for all your requirements for Weston Instruments.

WESTON SPECIAL METERS

VOLUME LEVEL METERS

MODEL 302 TYPE 30 A



MODEL 1932 TYPE 30 A

0
20
40
60
80
100

MODEL 1942 TYPE 30 B

Weston VU Meters are available with a choice of two (2) scales (except 1922 and 1932). Type A stresses the level in VU and is used largely in monitoring wire lines. Type B emphasizes percent use of transmitter output and is the standard for broadcast service. The VU meter is designed to read zero VU or 100% with 1.228 volts applied to the meter and a 3600 ohms series resistor. This represents 4 DB above 1 MW in 600 ohms.

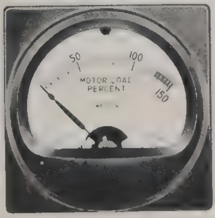
VOLUME LEVEL METERS

Model 302	**Type 30**	(Scale A or B)	Phenolic Case
Scale A	Rd./302-3301101		
Scale A	Sq./302-3601101		
Scale B	Rd./302-3301102		
Scale B	Sq./302-3601102		
Model 1922	**Type 30**	(Scale A)	Phenolic or Plastic Front
Scale A	/1922 — 3621001		
Model 1932	**Type 30**	(Scale A)	Phenolic or Plastic Front
Scale A	/1932 — 3621001		
Model 1942	**Type 30**	(Scale A or B)	Phenolic or Plastic Front
Scale A	/1942 — 3621001		
Scale B	/1942 — 3621002		

% LOAD METERS

The Percent Load Meters are basically 5 ampere ammeters, for use with 5 ampere secondary current transformers having scales captioned in "Motor Load-Percent". The scale range is 0-150%, with the section 125-150% blocked off in red to warn of overloading with the meter connected to the transformer secondary. A continuous visible check of load conditions on 1, 2 or 3 phase and 2, 3 or 4 wire a-c motors of any horsepower, commercial frequency or voltage is provided.

The transformer ratio must be adjusted to produce 5 amperes output from secondary when 150% of rated motor current is reached. Request Circular **01-405** on Weston Model 605 and 607 current transformers for a more complete explanation.



Model 304 Rd./304-2301106
Model 304 Sq./304-2601106
Round or Square Phenolic Case
(See Page 9 For Dimensions)

125
MOTOR LOAD PERCENT

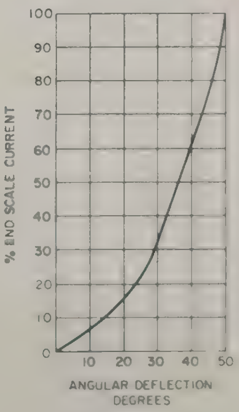
Model 1934 /1934-2622888
1944 /1944-2622888
Plastic or Phenolic Front
(See Pages 10 & 13 For Dimensions)

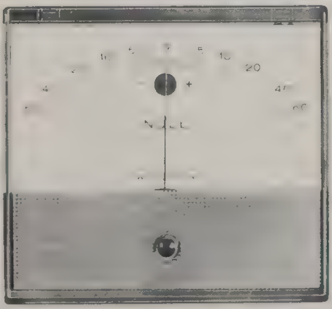
NULL METERS

Model 1936T (Taut Band) Sq./1936-5619069
(See page 10 for dimensions.)

Model 1946T (Taut Band) Sq./1946-5629069
(See page 13 for dimensions.)

*Resistance is 1700 ohms. End scale value 60-0-60 μa = 20%. Sensitivity at null point 0.5 μa/degree (0.4 μa/mm).





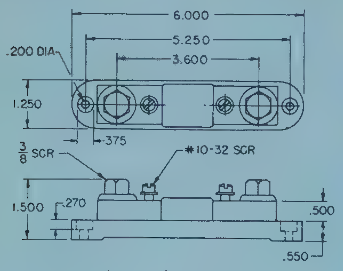
SEE PAGE 20 FOR
MOUNTING BEZELS
AND ILLUMINATION KITS.

1900 series instruments listed are with Bakelite Fronts. If plastic fronts are desired, use same catalog nber, but change 2nd catalog number digit from 6 to 8.

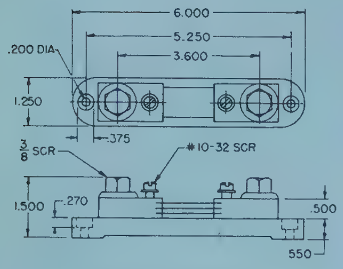
All meters are stock items. Any other practical range can be supplied.

GENERAL DIMENSIONS

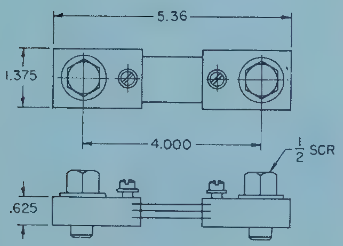
(ALL DIMENSIONS ARE APPROXIMATE)



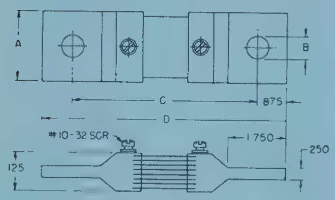
Up to 10 amperes



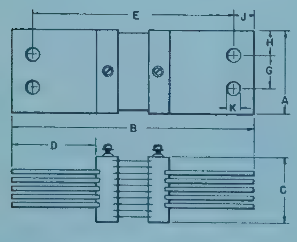
12 to 200 amperes



250 to 400 amperes



500 to 800 amperes



1000 amperes and above

ACCESSORIES

SHUNTS (50 MV DROP)

Only currents up to approximately 50 milliamperes can be taken into a moving coil, hence special provisions are made where current ranges exceed that limit. Direct current meters of ranges in excess of 50 milliamperes require the use of a parallel resistance circuit formed by one or several shunts. Where these ranges are moderate the shunts are usually self-contained. On higher ranges the shunts become physically large and convert more than a few watts into heat, so that they are used as accessories, external to the meter. (The shunt is a current by-pass).

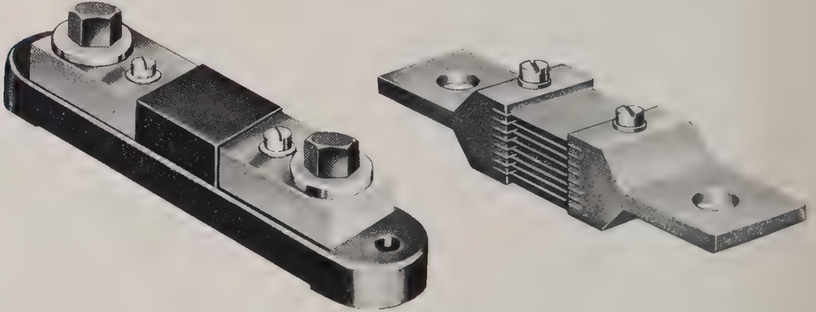
Weston high and low range shunts have liberal allowance for overload capacity and adequate contact surface. They are adjusted for a 50 millivolt drop.

In addition to the shunts listed Weston stocks many switchboard shunts with 100 millivolt drop, and lightweight 50 millivolt shunts to the military specification MIL-S-61B. See Circular 01-407 for complete listing.

STANDARD LEADS

No. 18 plastic covered twisted leads, .065 ohm, 5′ long, 10-32 terminal for shunt connection on one end and tinned on other end. For other leads correspondence is invited.

Cap. Amps.	Part Number	Catalog Number
1	42258	0042258
2	42260	0042260
3	45790	0045790
5	42211	0042211
10	41196	0041196
15	41197	0041197
20	42166	0042166
25	41198	0041198
30	41199	0041199
50	41202	0041202
75	41205	0041205
100	41207	0041207
150	41210	0041210
200	41211	0041211
250	24683	0024683
300	23976	0023976
400	23977	0023977
500	23901	0023901
600	23902	0023902
800	23904	0023904
1000	124311	0124311
1500	124313	0124313
2000	124314	0124314
4000	124317	0124317



Range In Amps	Dim A	Dim B	Dim C	Dim D
500	1.250	.531	5.250	7.000
600	1.500	.531	5.250	7.000
750	2.000	.531	5.250	7.000
800	2.000	.531	5.250	7.000

500 to 800 amperes

Range	No. of Blades	No. of Alloy Strips	A	B	C	D	E	G	H	J	K
			In.	In.	In.	In.	In.	In.	In.	In.	In.
1000	2	4	3.0	8.96	1.65	2.34	7.46	1.5	0.75	0.75	0.531
1200	2	4	3.0	8.96	1.65	2.34	7.46	1.5	0.75	0.75	0.531
1500	3	5	3.0	8.96	2.01	2.34	7.46	1.5	0.75	0.75	0.531
2000	3	5	4.0	8.96	2.01	2.34	7.46	2.0	1.0	0.75	0.531
3000	4	8	4.0	14.35	3.10	5.035	11.85	2.0	1.0	1.25	0.656
4000	4	8	5.0	14.35	3.10	5.035	11.85	2.0	1.5	1.25	0.812
6000	5	10	6.0	14.85	3.82	5.035	12.35	2.75	2.75	1.25	0.812
8000	6	14	6.0	14.85	5.27	5.035	12.35	2.75	2.25	1.25	0.812

1000 amperes and above

FOR A COMPLETE LIST OF ALL 50 & 100 MV SWITCHBOARD SHUNTS ASK FOR CIRCULAR 01-407.

TUBULAR RESISTORS

(SEE CIRCULAR 01-408 FOR COMPLETE SPECIFICATIONS.)

Weston Tubular Resistor Multipliers (Model 9858) use film type resistors. In tubular resistor form, the assembly surpasses or equals the performance of wire wound units in all respects. They meet and exceed all of the requirements of MIL-R-29A.

The resistor is intended to be mounted in a horizontal position in fuse clips on standoff insulators; however, it can be mounted in any position. The insulated portion of the tube should not be used for support, nor should it approach any metal closer than would be good practice for a live conductor carrying the same potential. Fuse clips are recommended having a spring clamping action for rugged mechanical installation and positive contact.

KV Rating	Resistance Megohms	Overall Length ±1/32″	MIL-R-29A Type	Catalog Number
0.5	0.5	2 15/16″	MFC 504	9900001
0.8	0.8	2 15/16″	MFC 804	9900002
1.0	1.0	2 15/16″	MFC 105	9900003
2.5	2.5	5 9/32″	MFB 255	9900006
4.0	4.0	9 25/32″	MFA 405	9900009
5.0	5.0	9 25/32″	MFA 505	9900010
6.0	6.0	9 25/32″	MFA 605	9900011
10.0	10.0	16 1/2″	MFD 106	9900012
15.0	15.0	23 1/2″	FME 156	9900013
20.0	20.0	30 1/2″	MFF 206	9900014

MODEL 9808 MOUNTING CLIPS FOR TUBULAR RESISTORS

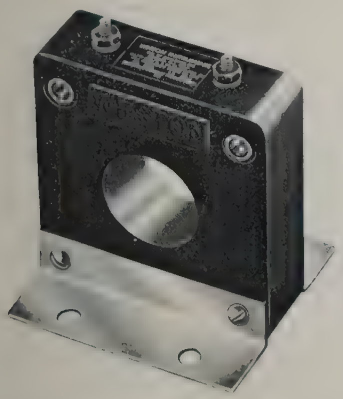
CATALOG NO.	TYPE	PRICE
9808 — 0029046	MFC	$0.60 per pair
9808 — 0029047	MFA, MFB	0.75 per pair

TRANSFORMERS

(Current Type)

Current transformers extend the ranges of a-c ammeters as do shunts for d-c meters. Basic meter ranges for transformer use are usually 5 amperes. Meter transformers in addition to permitting measurement of large currents perform the important function of insulating the meter from the line. This affords safety in use.

Weston transformers are the inserted primary toroidal type and are for use with 1% and 2% panel ammeters.



SEE CIRCULAR 01-405 FOR COMPLETE SPECIFICATIONS.

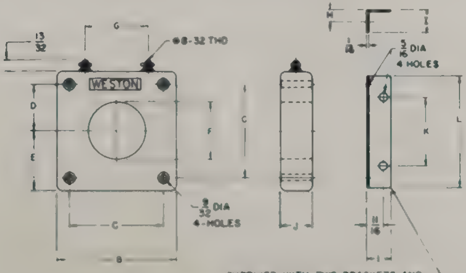
RANGES—Model 605 Current Transformer (5 Amp Secondary)

	ASA ACCURACY CLASS 60 cps			
Primary Amps	. . . 1.5 va	B 0.1 2.5 va	B 0.2 5 va	Catalog Number
100	*	. . .	. . .	0174975
150	. . .	1.2	1.2	0174976
200	. . .	0.6	1.2	0174977
300	. . .	0.6	0.6	0174978
400	. . .	0.6	0.6	0174979

RANGES—Model 607 Current Transformer (5 Amp Secondary)

	ASA ACCURACY CLASS 60 cps		
Primary Amps	B 0.1 2.5 va	B 0.2 5 va	Catalog Number
500	0.6	0.6	0174980
600	0.6	0.6	0174981
800	0.6	0.6	0174982
1000	0.3	0.3	0174983
1200	0.3	0.3	0174984
1500	0.3	0.3	0174985

*Meets the requirements of ASA accuracy class 1.2 for ratio correction factor; phase angle errors will be less than 1° at 100% rated current and less than 2.5° at 10% rated current.



SUPPLIED WITH TWO BRACKETS AND HARDWARE FOR MTG BRACKETS TO SIDES OR BOTTOM OF TRANSFORMER

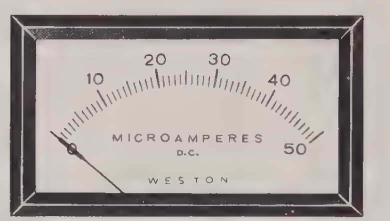
DIMENSION	A	B	C	D	E	F	G	H	I	J	K	L
MODEL 605	3 3/4	3 5/8	2 3/4	1 3/8	1 13/16	1 15/32	1 7/8	7/16	3/4	1 3/16	1 7/8	3 1/2
MODEL 607	4 11/16	4 11/16	3 3/4	1 7/8	2 11/32	2 5/16	2 1/2	15/32	7/8	1 5/16	2 3/4	4 1/2

All meters are stock items. Any other practical range can be supplied.

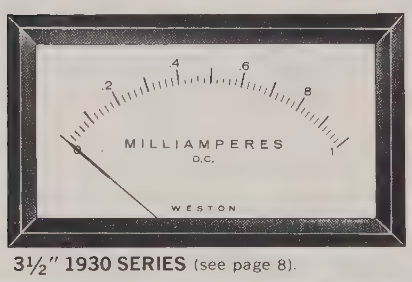
MODEL 1909
MOUNTING BEZELS

Mounting bezels are available for 1900 Series instruments with *clear plastic fronts* only. They have been designed for panel thicknesses of ⅛″ max. and are supplied in a flat black enamel finish. Each bezel, its mounting hardware and drilling template are packed in a plastic bag.

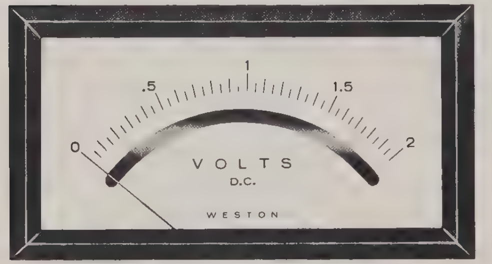
Description	Catalog Number
Half Bezel for Models 1921/2/4	0198486
Half Bezel for Models 1931/2/4	0198487
Half Bezel for Models 1941/2/4/66	0198488
Half Bezel for Models 1951/4/6	0198489
Half Bezel for Models 1971/1976	0256375



2½″ 1920 SERIES (see page 5).



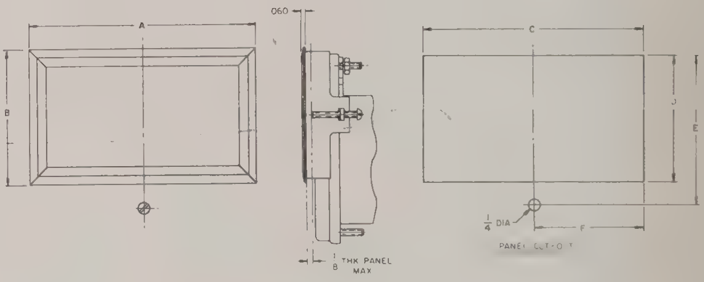
3½″ 1930 SERIES (see page 8).



4½″ 1940 SERIES (see page 12).

Only the scale is visible since meter is mounted behind the panel . . . half bezel fits into window.

Double bezel for 111 Cat. No. 0256259.



MODEL	A	B	C	D	E	F
1921 1922 1924	3.120	1.720	3.000	$1\frac{19}{32}$	2.070	1½
1931 1932 1934 1936	3.860	2.265	$3\frac{23}{32}$	$2\frac{5}{32}$	2.550	$1\frac{55}{64}$
1941 1942 1944 1946	4.960	2.900	$4\frac{13}{16}$	2¾	3.290	$2\frac{13}{32}$
1951 1954 1956	6.060	3.300	5⅞	$3\frac{5}{32}$	3.950	$2\frac{15}{16}$
1971 1976	8.250	4.450	$8\frac{1}{16}$	$4\frac{17}{64}$	5.670	$4\frac{1}{32}$

COLORED PLASTIC INSERTS CAN BE SUPPLIED WITH PLASTIC FRONTS ON THE 1920, 1930, 1940 AND 1950 SERIES AT $.55 LIST EXTRA. STANDARD COLORS ARE GRAY OR YELLOW. OTHER COLORS AVAILABLE.

ILLUMINATION KITS

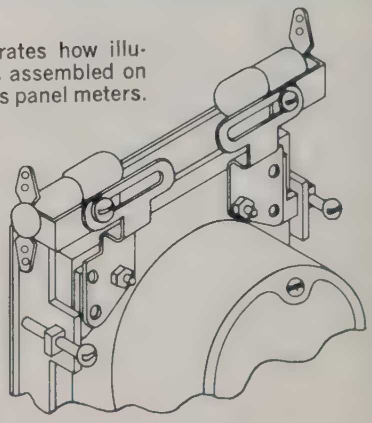
(For use with Plastic Front Model 1900 Series Meters only)

If scale illumination is required a kit can be furnished at an additional charge. Kit consists of: (1) Special half frame bezel, (2) Mounting brackets and light sockets. (Bulbs not included. Recommended bulb: NEMA #47 - 64 Frosted White Lamp). Weston Part No. ND 21865

Model	Part No.	Cat. No.
1930 Series	245509	0245509
1940 Series	245510	0245510
1950 Series	245511	0245511

NOTE: Panel cutout same as shown for mounting bezels above.

Drawing illustrates how illumination kit is assembled on the 1900 Series panel meters.



OPTICAL RIBBON INDICATOR

1316 SERIES

ELECTRICALLY DRIVEN

Available for the first time through Weston's exclusive capability in optical meters, is a ribbon indicator for use with electronic systems. With the Weston Model 1316 Optical Ribbon Indicator you can quickly scan the status of many parameters. It makes a perfect display device for temperature; it's ideal for medical patient-station monitoring; inspection histograms; temperature profiles (with multiple units); gauging liquid or material levels, or monitoring a roomful of machining operations. The optical projection eliminates parallax problems, and the scale can be changed as often as desired without exposing the mechanism. Flat, self-shielded mechanism design permits side-by-side mounting for group display.

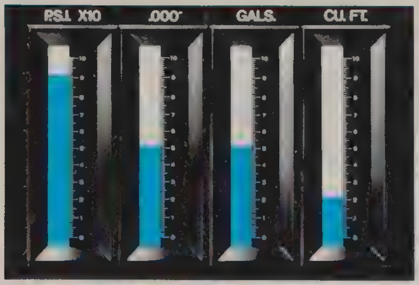
*Note: Model 1316 is not recommended for applications where ambient room illumination exceeds 100 foot candles.

DC VOLTMETERS

MODEL	1316	
RANGE	Resis.	Vert. Mtg.
0-1	1000 Ohms Per Volt	1912001
0-5		1912005
0-10		1912010
0-20		1912020
0-50		1912050
0-100		1912100
0-150		1912150
0-200		1912200
0-300		1912300
0-500		1912500

DC MICROAMMETERS

MODEL	1316	
RANGE	Resis.	Vert. Mtg.
0-20	8350	5912020
0-50	815	5912050
0-100	184	5912100
0-200	131	5912200
0-500	19.8	5912500


P.S.I. X10
.000'
GALS.
CU. FT.

MODEL 9960

Special scales are available for the model 1316 without captions from stock. All are 50 division scales.

SCALES	CATALOG NO.
0-1	266933
0-5	266934
0-10	266935
0-50	266848
0-100	266812

DC MILLIAMMETERS

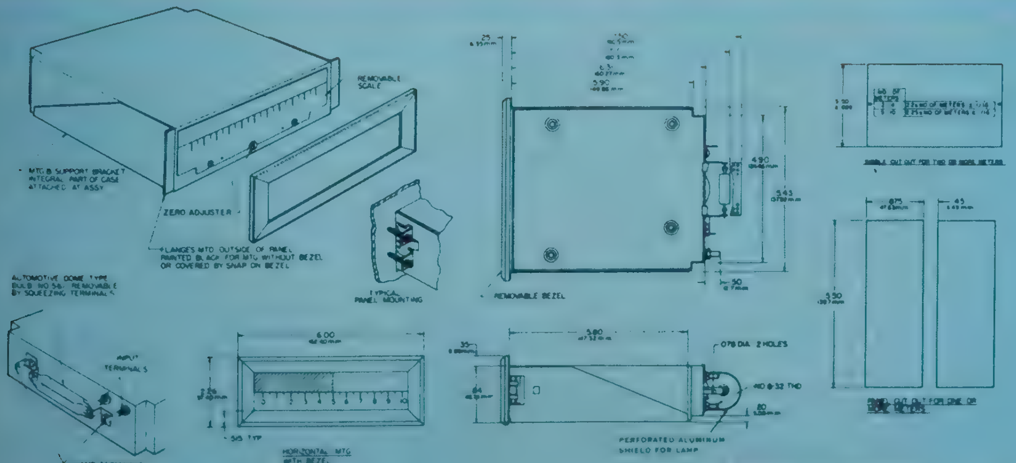
MODEL	1316	
RANGE	Resis.	Vert. Mtg.
4-20 (suppressed zero)	2.5	4912920*
10-50 (suppressed zero)	1.0	4912950*
0-1	13.8	4912001
0-5	10	4912005
0-10	5	4912010
0-20	2.5	4912020
0-25	2	4912025
0-50	1	4912050
0-100	.5	4912100
0-250	.2	4912250
0-500	.1	4912500

*Scales are 0-100 with no caption.

DC MILLIVOLTMETERS

MODEL	1316	
RANGE	Resis.	Vert. Mtg.
0-50	500 Ω/v	9912050*
0-100	500 Ω/v	9912100*

*Scales are 0-100 with no caption.


REMOVABLE SCALE
MTG & SUPPORT BRACKET INTEGRAL PART OF CASE ATTACHED AT ASSY
ZERO ADJUSTER
FLANGES MTG OUTSIDE OF PANEL PAINTED BLACK FOR MTG WITHOUT BEZEL OR COVERED BY SNAP ON BEZEL
TYPICAL PANEL MOUNTING
AUTOMOTIVE DOME TYPE BULB NO 56 REMOVABLE BY SQUEEZING TERMINALS
INPUT TERMINALS
LAMP TERMINALS
6.00
HORIZONTAL MTG WITH BEZEL
REMOVABLE BEZEL
4.90
5.43
.50
.078 DIA 2 HOLES
PERFORATED ALUMINUM SHIELD FOR LAMP
.875
.45
3.50

All dimensions are approximate

All meters are stock items. Any other practical range can be supplied.

MODEL 1315 OPTICAL RIBBON INDICATOR RELAY

The Weston Model 1315 Optical Ribbon Indicator Relay provides three important features required for new and diverse applications in areas of industrial research, chemical processing, and medical electronics: bar graph visual display, accurate control capability, and fail-safe operation.

The Model 1315 features an illuminated moving bar display and is available with either one or two set points. Indication accuracy is ±2%; repeatability is ±0.5%.

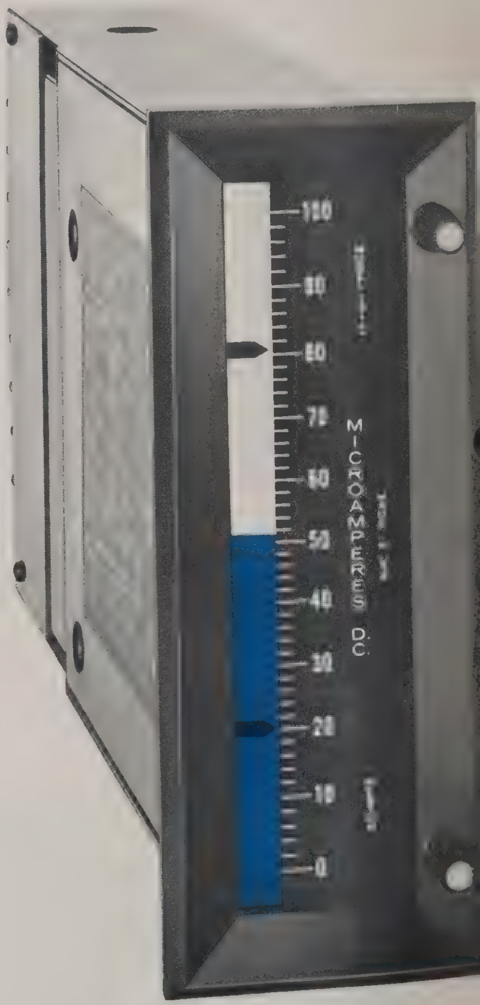
The output available from each control power relay is ten amperes per set point non-inductive. Switching is accomplished by a light-activated SCR for each set point. Set points are adjusted by front panel controls.

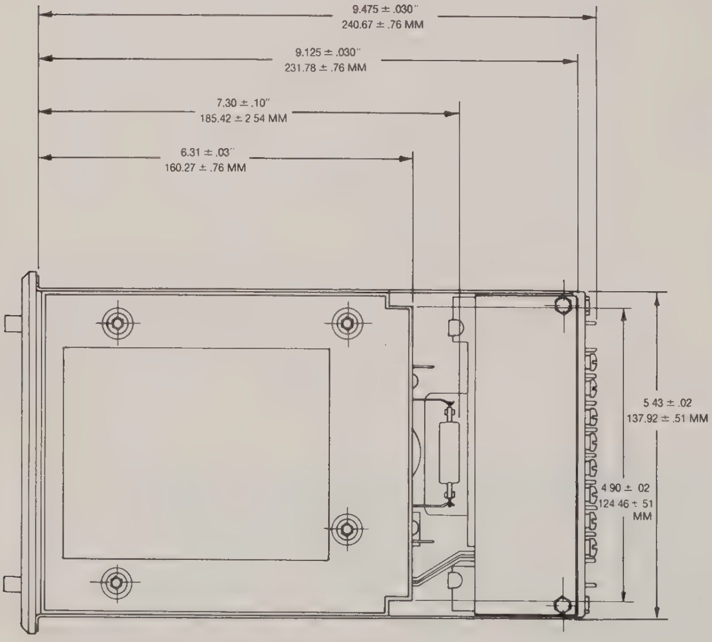
The Model 1315 is self-illuminated, utilizing a single lamp operated at 11.0 volts AC ±10%. Expected lamp life is 5,000 hours (minimum). Horizontal or vertical scales are available. Scale length is 4½ inches.

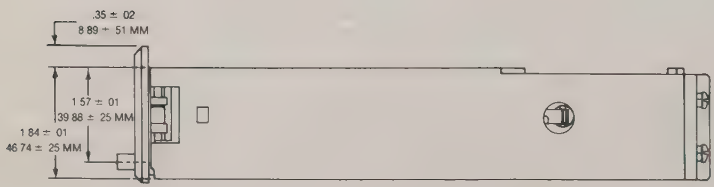
For optimum readability under high illumination environment (over 125 foot candles) contact Weston for mounting recommendations.

Model 1315 Optical Ribbon Indicator Relay

Range	Contacts	Catalog No.
0-1 ma	High and Low	4901001
0-20 mics	High and Low	5901020

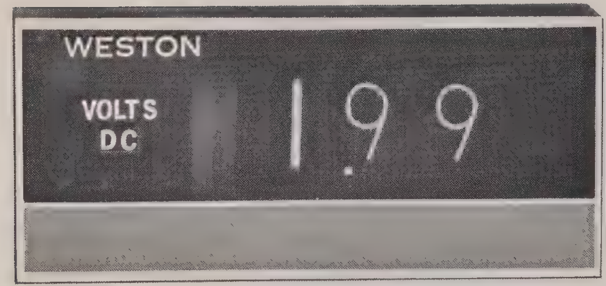

100
90
80
70
60
50
40
30
20
10
0
MICROAMPERES DC


9.475 ± .030"
240.67 ± .76 MM
9.125 ± .030"
231.78 ± .76 MM
7.30 ± .10"
185.42 ± 2 54 MM
6.31 ± .03"
160.27 ± .76 MM
5 43 ± .02
137.92 ± .51 MM
4 90 ± 02
124 46 ± 51
MM


.35 ± 02
8 89 ± 51 MM
1 57 ± 01
39 88 ± 25 MM
1 84 ± 01
46 74 ± 25 MM

SPECIFICATION SELECTION GUIDE

SPECIFICATIONS	DIGITAL PANEL METERS			
	MODEL 1260	MODEL 1290	MODEL 1292	MODEL 1294
Ranges (Voltages) and Input Impedance	0-199 MV @ 20 K 0-1.99 V @ 200 K 0-19.9 V @ 2 Meg 0-199 V @ 2 Meg 0-1000 V @ 2 Meg	0-100 MV @ 10 K 0-1.00 V @ 100 K 0-10.00 V @ 1 Meg 0-100 V @ 1 Meg 0-1000 V @ 1 Meg	0-100 MV @ 100 Meg 0-1.00 V @ 1000 Meg 0-10.00 V @ 10 Meg 0-100 V @ 10 Meg 0-1000 V @ 10 Meg	0-100 MV @ 10 Meg 0-1.00 V @ 100 Meg 0-10.00 V @ 10 Meg 0-100 V @ 10 Meg 0-1000 V @ 10 Meg
Ranges (Current)	0-19.9 ua @ 200 MV 0-199 ua @ 200 MV 0-1.99 MA @ 200 MV 0-19.9 MA @ 200 MV 0-199 MA @ 200 MV	0-10 ua @ 100 MV 0-100 ua @ 100 MV 0-1 MA @ 100 MV 0-10 MA @ 100 MV 0-100 MA @ 100 MV	0-1 ua @ 100 MV 0-10 ua @ 100 MV 0-100 ua @ 100 MV 0-1 MA @ 100 MV 0-10 MA @ 100 MV 0-100 MA @ 100 MV	0-10 ua @ 100 MV 0-100 ua @ 100 MV 0-1 MA @ 100 MV 0-10 MA @ 100 MV 0-100 MA @ 100 MV
Accuracy	±0.5% F.S. ±1 Digit 25°C ± 10°C	±0.1% F.S. ±1 Digit 25°C ± 10°C	±0.1% F.S. ±1 Digit 25°C ± 10°C	±0.05% RDG. ±1 Digit ±10 uV
BCD Output	Optional	Standard	Standard	Optional
Overrange	25% (Except 1000 V)	100% (Except 1000 V)	100% (Except 1000 V)	100% (Except 1000 V)
Readings/Second	10/second (Std.)	6/second (Std.)	5/second (Std.)	5/second (Std.)
Common Mode Rejection (CMRR)	80 dB @ 60 Hz	80 dB @ 60 Hz	80 dB @ 60 Hz	80 dB @ 60 Hz
Normal Mode Rejection (NMRR)	35 dB @ 60 Hz	35 dB @ 60 Hz	35 dB @ 60 Hz	40 dB @ 60 Hz
Power Requirements 220 Volt Units Available on Special Order	117 V ± 10% 50-400 Hz 5 watts	117 V ± 10% 60-400 Hz 50 Hz (optional) 5 watts	117 V ± 10% 60-400 Hz 50 Hz (optional) 7 watts	117 V ± 10% 50-60 Hz 6 watts
Response Time To Full Scale Input	Less than 1 second	Less than 1 second	Less than 2 seconds	Less than 1 second
Approximate Weight	1 lb.	1¼ lbs.	1¼ lbs.	Less than 2 lbs.



MODEL 1260 ECONOMY DPM

The Model 1260 is an economy Digital Panel Meter which is priced in an area truly compatible with analog instruments. To achieve a design in this price range Weston Engineering developed a novel voltage-to-time converter having the simplicity of dual slope integration but with considerably fewer components. The converter is packaged with its complete power supply and readout on a single side of a printed circuit board measuring 4" x 3". This new circuit achieves the cost objectives without sacrificing high normal and common mode rejection with a non-blinking readout.

MODEL 1260 FEATURES

1. 25% over-range is standard.
2. Takes only 7 sq. inches of panel space—less than any other DPM on the market.
3. Complete 1260 can be mounted entirely from front of panel.
4. Complete chassis removal from front of panel—can be exchanged with new chassis in less than 30 seconds.
5. Sampling rates tied to phased locked fundamentals of 60 Hz for excellent noise rejection characteristics.
6. Circularly polarizing viewing window.
7. Top rated components including Burroughs Nixies®.
8. Circuit boards "Repairable"—not potted.
9. ±.5% F.S. ±1 digit accuracy. Special features such as BCD output, remote hold and special captions can be supplied on order.

MODEL 1260 RANGES

RANGES: Volts	Input Resistance	Cat. No.
0-199 millivolts	20 K ohms	1260-0267381
0-1.99 volts	200 K ohms	1260-0267382
0-19.9 volts	2 megohms	1260-0267383
0-199 volts	2 megohms	1260-0267384
0-1 kilovolts	2 megohms	1260-0267385
Current:		
0-19.9 microamps	10 K ohms	1260-0267386
0-199 microamps	1 K ohm	1260-0267387
0-1.99 milliamps	100 ohms	1260-0267388
0-19.9 milliamps	10 ohms	1260-0267389
0-199 milliamps	1 ohm	1260-0267390

WESTON
MILLIVOLTS D.C.
199.9

MODEL 1290 OVER-RANGE WITH STORAGE DISPLAY

The Weston Model 1290 DPM* is a 3-digit instrument featuring dual-slope integration (Weston patent 3,051,939), full-storage display, BCD output and many other standard features that are still "optional at extra cost" on competitive units. The complete unit, including power supply, is designed to fit into seven square inches of panel space. That's less space than required by any other digital panel meter. The Model 1290 mounts completely from the front of the panel. The entire chassis pulls out from the front of the unit for servicing or parts replacement.

MODEL 1290 FEATURES

1. 100% over-range is standard.
2. Full storage display is standard.
3. Takes only 7 square inches of panel space—less than any other DPM on the market.
4. Complete 1290 can be mounted entirely from front of panel.
5. Complete chassis removal from front of panel—can be exchanged with new chassis in less than 30 seconds.
6. 1-2-4-8 BCD positive output logic is standard.
   $0 = <0.4$ V
   $1 = >1.0$ V
7. Sampling rates tied to phased locked fundamentals of 60 Hz for excellent noise rejection characteristics.
8. Circular polarizing viewing window.
9. Top rated components including Burroughs Nixie® tubes.
10. "Plug-in" Nixies—no soldering to replace.
11. Circuit boards "Repairable"—not potted.

MODEL 1290 RANGES

Full Scale Rating	Input Impedance	Catalog No.
0-100.0 MV DC	10 K ohms	1290-0267290
0-1.000 V DC	100 K ohms	1290-0267291
0-10.00 V DC	1 megohm	1290-0267292
0-100.0 V DC	1 megohm	1290-0267293
0-1000 V DC	1 megohm	1290-0267294
0-10.00 ua DC	100 millivolts	1290-0267295
0-100.0 ua DC	100 millivolts	1290-0267296
0-1.000 MA DC	100 millivolts	1290-0267297
0-10.00 MA DC	100 millivolts	1290-0267298
0-100.0 MA DC	100 millivolts	1290-0267299

WESTON
MILLIVOLTS D.C.
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MODEL 1292 BI-POLAR DPM

The Model 1292 DPM is a bi-polar, 3½ digit unit, that provides an input impedance greater than 100 megohms on a 100-millivolt range and greater than 1000 megohms on a 1-volt range. An input impedance of 10 megohms is provided on all other voltage ranges.

Another outstanding feature of the Model 1292 concerns the measuring circuitry which utilizes dual-slope integration (Weston patent 3,051,939). Separate references are used for both end points of the range, thus making the zero point independent of end scale adjustments. This feature makes it easier to adjust end scale points and provides greater stability at zero input.

The entire unit, including polarity and out range indicators, is packaged in the standard Model 1290 case which occupies only 7 square inches of panel space.

MODEL 1292 FEATURES

- 100% over-range (except for 1,000 volt range).
- Takes only 7 sq. inches of panel space—less than any other DPM on the market.
- Complete 1292 can be mounted entirely from front of panel.
- Complete chassis removal from front of panel—can be exchanged with new chassis in less than 30 seconds.
- BCD output is standard.
- Separate references provided for positive and negative measurements.
- Highest input impedance available.
- Sampling rates tied to phase-locked fundamentals of 60 Hz for excellent noise rejection characteristics.
- Circuit boards "Repairable"—Not potted.
- Top rated components including Burroughs Nixie* tubes.

MODEL 1292 RANGES

Full Scale Rating	Input Impedance	Catalog No.
0-100 millivolts	100 megohms	1292-0270200
0-1 volt	1000 megohms	1292-0270201
0-10 volts	10 megohms	1292-0270202
0-100 volts	10 megohms	1292-0270203
0-1000 volts	10 megohms	1292-0270204
0-1 microamp	100 K ohms	1292-0270205
0-10 microamps	10 K ohms	1292-0270206
0-100 microamps	1 K ohm	1292-0270207
0-1 milliamp	100 ohms	1292-0270208
0-10 milliamps	10 ohms	1292-0270210
0-100 milliamps	1 ohm	1292-0270211

WESTON
MILLIVOLTS D.C.
-1 9 9 9.9

MODEL 1294 DIGITAL PANEL METER

Weston's new Model 1294 Digital Panel Meter is designed for today's most stringent requirements. The Model 1294, a 4½ digit bi-polar DPM, features a display of 19999 and 10 microvolt sensitivity (on the 100 mv range). It utilizes state-of-the-art T^2L logic and unique time-sharing circuitry that limits power consumption to less than six watts, making battery operation possible. Reading rate is 5 per second and response time is less than 0.7 seconds with an accuracy of 0.05% of reading ±1 digit ±10 microvolts.

The Model 1294 DPM occupies only 7 square inches of panel space and is housed in Weston's standard DPM case, allowing interchangeability with all other Weston DPM's. The instrument can be completely mounted and serviced from the front of the panel.

MODEL 1294 FEATURES

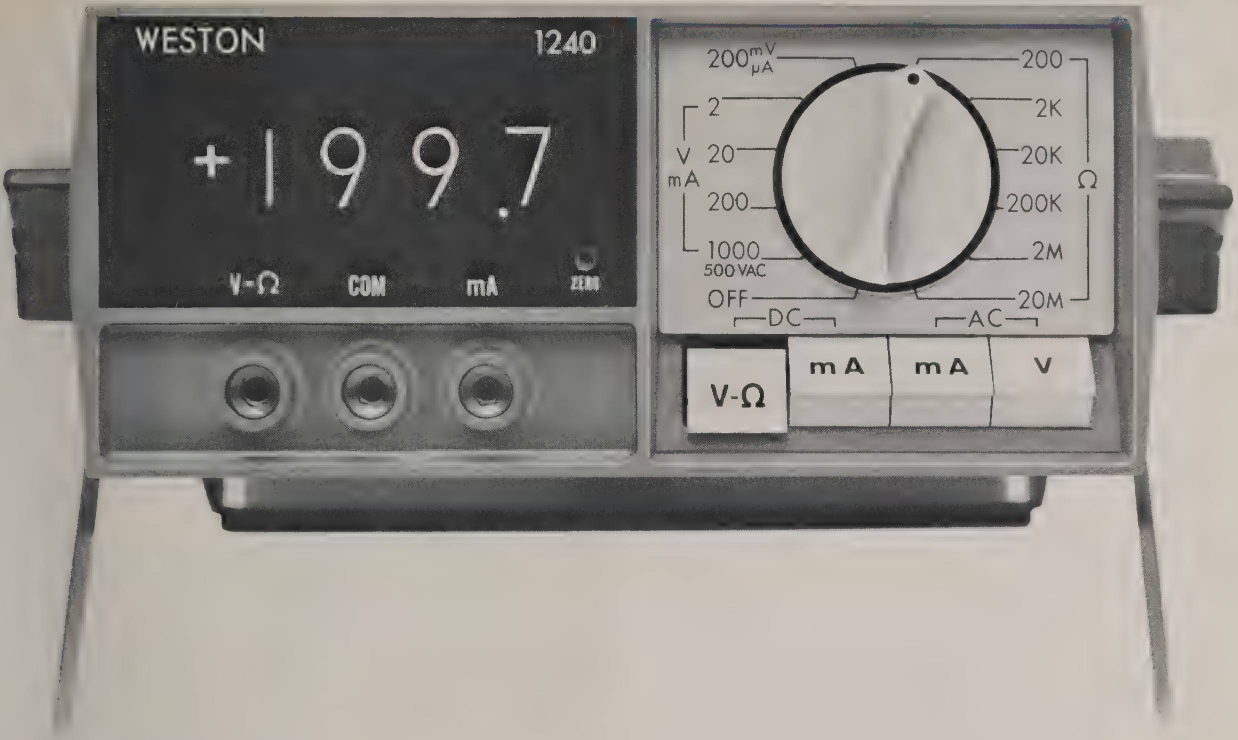
- 4½ digit display (19999)
- Full bi-polar operation
- High input impedance
- 100% overrange capacity (19999)
- T^2L logic
- Dual Slope integration for long term stability
- Takes only 7 square inches of panel space
- Complete 1294 can be mounted entirely from front of panel
- Circuit boards "Repairable"—not potted
- Top rated components including Burroughs Nixie® tubes

MODEL 1294 RANGES

Full Scale Rating	Input Impedance	Catalog No.
0-100 millivolts	10 megohms	1294-0270600
0-1 volt	100 megohms	1294-0270601
0-10 volts	10 megohms	1294-0270602
0-100 volts	10 megohms	1294-0270603
0-1000 volts	10 megohms	1294-0270604
0-10 microamps	100 MV Drop	1294-0270605
0-100 microamps	100 MV Drop	1294-0270606
0-1 milliamp	100 MV Drop	1294-0270607
0-10 milliamps	100 MV Drop	1294-0270608
0-100 milliamps	100 MV Drop	1294-0270609

WESTON
1240
+1990
VΩ
mA
mA
V

DIGITAL MULTIMETERS



GENERAL DESCRIPTION

The Weston Model 1240 is a new compact Digital Multimeter with 26 ranges for measuring DC and AC voltage, DC and AC current and resistance.

Operator convenience has been stressed in its straightforward control layout which includes a single range selector and feather touch function switches. Long life is assured thru the use of overload protection on all circuits along with a glass filled thermoplastic case for shock resistance. Superior mechanical features are offered such as fully-recessed controls, adjustable tilt stand and carrying handles, all protection fuses replaceable without opening case, standard unit will "rack mount," and battery pack which plugs into the back will permit the Model 1240 to be transported in a standard attache case.

The heart of the multimeter circuitry is a high-impedance bipolar A/D converter operating on the dual-slope principle (Weston patent no. 3,051,939). It has a basic range of 200 millivolts and achieves its high impedance by means of potentiometric feedback around its integrator. All other ranges and functions are first converted to this basic DC range for measurement by the A/D converter.

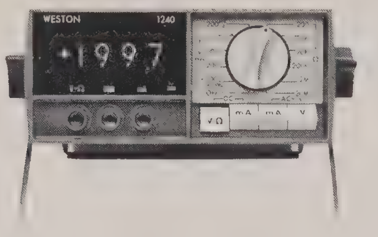
AC is converted to DC by an average-sensing RMS calibrated converter assembly. Current is measured by the voltage drop it establishes across a precision ring shunt network. Resistance is measured by passing a scaled constant current through the unknown and measuring the DC voltage across it.

All circuits on the 1240 are protected for overloads either through a resistor-diode network, or through fuses, which are replaceable from outside of the case. Two fuses are located behind the input jacks on the case front, the third fuse is found behind the AC line input receptacle on the back panel. All fuses may be reached by simply removing the related receptacles. Removal tools have been provided on the ends of the portahandle locking knobs. A high-impact, shock-resistant plastic case protects the system in virtually every field environment.

FEATURES

- All protection fuses replaceable without opening the case.
- Standard unit will panel mount without need for any accessory parts.
- Completely portable
  - Weighs only 4 pounds
  - Shock resistant case
  - Less than 3" high, fits into standard attache case
  - Battery pack available
  - Carrying case available
- All switches can be operated by one hand.
- Adjustable tilt stand also serves as carrying handle.
- Uses quality components.
- 200 millivolt range allows use of many Weston transducers such as DC shunts.

SPECIFICATIONS
Model 1240 AC / DC Multimeter



Model 1240
Catalog No. 1240-0267325

Leather Carrying Case Model 9740
Catalog No. 9740-0269562

D.C. VOLTS

RANGES	RATED ACCURACY	INPUT IMPEDANCE
0-0.2 V	0.1% Rdg. ±1 Digit on all ranges	100 M
0-2 V		1000 M
0-20 V		10 M
0-200 V		10 M
0-1000 V		10 M

D.C. AMPS

RANGES	RATED ACCURACY	VOLTAGE DROP (NOMINAL)
200 uA	±0.25% Rdg. ±1 Digit	0.2 V on all ranges
2 MA	±0.2% Rdg. ±1 Digit	
20 MA	±0.2% Rdg. ±1 Digit	
200 MA	±0.3% Rdg. ±1 Digit	
2 A	±0.5% Rdg. ±1 Digit	

A.C. VOLTS

RANGES	RATED ACCURACY	INPUT IMPEDANCE
200 MV	0.5% Rdg. ±1 Digit on all ranges	1 Megohm on all ranges
2 V		
20 V		
200 V		
500 V		
FREQUENCY RANGE	40 Hz to 10 K Hz 1% Rdg. ±1 Digit for 10 K Hz to 20 K Hz Frequency Range	

A.C. AMPS

RANGES	RATED ACCURACY	VOLTAGE DROP (NOMINAL)
2A	0.75% Rdg. ±1 Digit	0.2 V on all ranges
200 MA	0.7% Rdg. ±1 Digit	
20 MA	0.7% Rdg. ±1 Digit	
2 MA	0.8% Rdg. ±1 Digit	
200 uA	1% Rdg. ±1 Digit	
FREQUENCY	RANGE: 40 Hz to 10 K Hz	

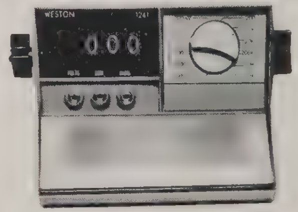
OHMS

RANGES	ACCURACY	CURRENT OUTPUT	MAX. V APPLIED
200 ohms	0.5% Rdg. ±1 Digit	1 MA	0.2 V
2 K ohms	0.5% Rdg. ±1 Digit	100 uA	0.2 V
20 K ohms	0.5% Rdg. ±1 Digit	10 uA	0.2 V
200 K ohms	0.5% Rdg. ±1 Digit	10 uA	2 V
2 M ohms	0.5% Rdg. ±1 Digit	1 uA	2 V
20 M ohms	±1 Rdg.	100 nA	2 V

MODEL 1240 / 1241 GENERAL SPECIFICATIONS

Out-of-Range Indication:	Flashing light indicates when unit is out-of-range.
Polarity Indication:	Lighted sign automatically indicates polarity.
Temperature Range:	10°–40°C
Temperature Influence:	±0.005% Rdg./°C ±0.005% FS/°C
Humidity:	85% humidity at 36°C
Vibration:	5–10 Hz for 1 hour at 0.4 G 10–50 Hz for 11 milliseconds at 2 G
Shock:	50 G on 3 axes
CMR:	80 DB at 60 Hz with 1000 ohm unbalance
NMR:	35 DB at 60 Hz
Readings/Second:	5 (Non-blinking display)
Input Power:	115 or 230 V + 15%, — 10%, 6 watts nominal, from 50–400 Hz
Size:	7" W x 3" H x 7.9" D
Weight:	4 lbs.

SPECIFICATIONS Model 1241 Volt Ohmmeter



Model 1241
Catalog No. 1241-0269070

Leather Carrying Case Model 9740
Catalog No. 9740-0269562

D.C. VOLTS

RANGES	RATED ACCURACY	INPUT IMPEDANCE
0-0.2 V	0.1% Rdg. ±1 Digit on all ranges	100 M
0-2 V		1000 M
0-20 V		10 M
0-200 V		10 M
0-1000 V		10 M

OHMS

RANGES	ACCURACY	CURRENT OUTPUT	MAX. V APPLIED
200 ohms	0.5% Rdg. ±1 Digit	1 MA	0.2 V
2 K ohms	0.5% Rdg. ±1 Digit	100 uA	0.2 V
20 K ohms	0.5% Rdg. ±1 Digit	10 uA	0.2 V
200 K ohms	0.5% Rdg. ±1 Digit	10 uA	2 V
2 M ohms	0.5% Rdg. ±1 Digit	1 uA	2 V
20 M ohms	±1 Rdg.	100 nA	2 V

BATTERY PACK MODEL 9740

WESTON
1240

The Model 9740-270520 is a battery powered supply capable of operating a Weston Model 1240 or 1241 for approximately 6 hours. Recharge time is in the order of sixteen hours. Number of recharge cycles typically possible with a single battery is a minimum of 100.

It is packaged in a leather case approximately 7⅜" wide x 3⅜" high x 17" deep. Of the 17 inches depth approximately 8 inches will be allocated to house the digital multimeter, 2½ inches for the test lead compartment and 5½ inches for the battery pack. The battery pack is a self-contained unit capable of being operated with the digital multimeter in the leather case or when both are removed from the leather case. Contained within the battery pack will be space for the 12 volt battery (not supplied with battery pack), and all electronics and controls necessary to interface with the digital multimeter. The battery is a standard Globe gel/cell GC 1245 and must be ordered separately.

Catalog No. 9740-270520

BATTERY

GLOBE
gel/cell
GLOBE RECHARGEABLE BATTERY
GC 1245-1 12 VOLT 4.5 AMP-HR

The battery is a standard Globe gel/cell GC 1245, 12 volt unit stocked under number 9740-270145. This type of battery has special characteristics which makes it particularly suitable for use in the battery pack listed above. It is completely sealed.

Catalog No. 9740-270145

INDUSTRIAL CLASS PORTABLES

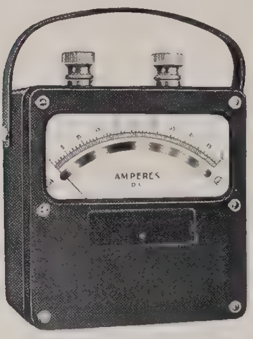
931-433 GROUP

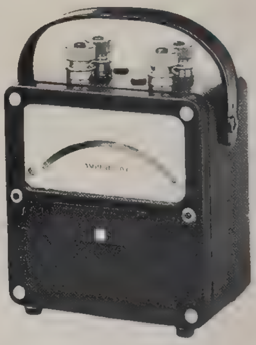
½ - ¾ % ACCURACY

These are matched portable instruments highly accurate for industrial a-c and d-c testing. They are moderately priced and designed for the requirements of the majority of industrial test situations. For highest readability all instruments have knife-edge pointers and mirror scales.

Leather carrying cases are available for all models. When ordering leather case, specify instrument model and catalog No.

Size: 5¼" x 5" x 3¼" — 133 x 127 x 83 mm **Scale Length: 4.04"**
D-C 931 — ½% Accuracy — Self-Shielded
Permanent Magnet Moving Coil Type
A-C 433 — ¾% Accuracy — Movable Iron Type
D-C, A-C 432 — ½% Accuracy — Electrodynamometer Type


Model 931


Model 433

D-C VOLTMETERS — Model 931

Range	Ohms Per Volt	Catalog Number
3	1000	931-1901004
15	1000	
30	1000	931-1901001
50	1000	931-1901003
150	1000	931-1901002
30/7.5/3	1000	931-1905003
75/30/7.5	1000	931-1905002
150/15/3	1000	931-1905001
300/150/3	1000	931-1905005
750/300/150	1000	931-1905006
30/7.5/3	5000	931-1906003
75/30/7.5	5000	931-1906002
150/15/3	5000	931-1906004
300/150/3	5000	931-1906006
500/100/10	5000	931-1906005
750/300/150	5000	931-1906001

D-C AMMETERS — Model 931

Range	Catalog Number
15	
5/0.5/0.05	931-2902007
5/2.5/0.5	931-2902008
10/1/0.1	931-2902006
10/5/1	931-2902009
15/3/1.5	931-2902003
25/10/2.5	931-2902012
30/15/3	931-2902005
50/5/0.5	931-2902013
50/10/2	931-2902002
50/20/5	931-2902001
50/25/10	931-2902004

Self contained up to 50 amperes inclusive. Instruments beyond 50 amperes must be utilized with 50 mV external shunts.

D-C MILLIAMMETERS — Model 931

Range	Approx. Resis. Ohms	Catalog Number
3/0.3/0.03	—	931-4904005
15/1.5/0.15	—	931-4904004
150/15/1.5	—	931-4904003
1500/150/15	—	931-4904002
3000/300/30	—	931-4904001

Single Range Milliameter with ranges above 20 mA are shunted and have a drop of 50 mV ±5%.

D-C MICROAMMETERS — Model 931

Range	Approx. Resis. Ohms	Catalog Number
30	2300	931-5901003
100	2000	
30	490	931-5902002
100	60	931-5902003
200	15	931-5902001

A-C VOLTMETERS — Model 433

(25-125 CYCLES)

Range	Approx. Resis. Ohms	Catalog Number
10	40	
150	5300	433-1901005
250	18,200	433-1901008
10/5	24/12	433-1902011
20/10	116/58	433-1903001
30/15	336/168	433-1903002
60/30	850/425	433-1903004
150/75	5300/2680	433-1903007
300/150	22,000/11,000	433-1903009
450/300/150	33,000/22,000/11,000	433-1905001
**600/300/150	44,000/22,000/11,000	433-1906002
**750/300/150	55,000/22,000/11,000	433-1906003

**Has extension on case to accommodate additional resistance necessary.

(25-1000 CYCLES)

Range	Catalog Number
150	433-1901007
60/30	433-1903005
150/75	433-1903008
300/150	433-1903010
600/300/150	433-1906001
†750/300/150	433-1907001

†Includes External Model 9990, Type 52 Box.

LEADS

Model 931 — External Shunt Ammeter:

One pair, 5 ft. long, rubber insulated leads, 40 x 30 braid-covered. Forked terminals both ends. Resistance 0.026 ohms.

Part No. 4516

Model 931,433 — Voltmeter:

One pair 5 ft. long, insulated leads. Forked terminal on one end, test probe on other.

Part No. 254761-901

All meters are stock items. Any other practical range can be supplied.

INDUSTRIAL CLASS PORTABLES

A-C AMMETERS — Model 433

Range	(25-500 CYCLES) Approx. Resis. Ohms	Catalog Number
1	0.48	433-2901001
5	0.020	433-2901002
15	0.0038	433-2901005
30	0.00063	
50	0.00038	
2/1	0.12/0.48	433-2903004
5/2.5	0.02/0.08	433-2903001
10/5	0.0083/0.028	433-2903005
20/10	0.004/0.0108	433-2903006
3/1.5/0.75	0.18/0.43/0.59	433-2906002
5/2.5/1	0.13/0.26/0.37	433-2906001
10/5/1	0.030/0.070/0.37	433-2906005
10/5/2.5	0.030/0.060/0.075	433-2906006
15/7.5/1.5	0.023/0.044/0.19	433-2906007
20/5/2	0.040/0.19/0.30	433-2907001
30/7.5/3	0.0090/0.036/0.040	433-2908001
50/20/5	0.0084/0.0011/0.020	433-2909001
50/20/10	0.0073/0.0080/0.010	433-2909002

For Ammeters with Adjustable Pointer-Stop add $11.75 to above prices.

A-C AMMETERS — Model 433

(25-1000 CYCLES)	
Range	Catalog Number
5/2.5/1	433-2906003
50/20/5	433-2909003

A-C MILLIAMMETERS — Model 433

(25-500 CYCLES)

Range	Resis.	Catalog Number
500	2.0	
150/75	30/120	433-4903005
300/150	6.4/26	433-4903002
500/250	1.6/6.6	433-4903006

(25-1000 CYCLES)

Range	Catalog Number
100/50	433-4903001
500/250	433-4903003

D-C AND SINGLE PHASE A-C WATTMETERS — Model 432
ACCURACY — ½%

Model 432

Model 432 is a true electrodynamometer used for a-c and d-c power measurements. It will measure true rms values when used on commercial wave forms since the wave form error, in general, is exceedingly small and practically unreadable.

Type: Electrodynamometer
(Shielded from External Magnetic Fields)

Case Size: 3¼" x 5" x 5¼" — 83 x 127 x 133 mm

Approx. Weight: 3¼ lbs. — 1.5 kgs.

Power Consumption: Potential circuit at 115 volts, 60 cycles — 1.2 watts, 1.2 volt-amperes. Current circuit at 5 amperes, 60 cycles — 0.65 watt, 0.68 volt-amperes.

FOR LOW POWER FACTOR USE — (25-125 CYCLES)

VOLTS		AMPERES		WATTS		
Normal	Maximum	Normal	Maximum	High Range	Low Range	Catalog No.
	300/150		5/2.5	300/150	150/75	432-9902009
	300/150		10/5	600/300	300/150	432-9902010

FOR GENERAL USE — (25-125 CYCLES)

150/75	200/100	1	1.5	150	75	432-9901001
150/75	200/100	5	7.5	750	375	432-9901005
300/150	400/200	1	1.5	300	150	432-9901002
300/150	400/200	5	7.5	1.5 kW	.75 kW	432-9901006
300/150	400/200	10	15	3 kW	1.5 kW	432-9901008
300/150	400/200	20	30	6 kW	3 kW	432-9901010
300/150	400/200	50	75	15 kW	7.5 kW	432-9901011
150/75	200/100	10/5	15/7.5	1500/750	750/375	432-9902005
200/100	260/130	5/2.5	7.5/3.75	1000/500	500/250	432-9902003
300/150	400/200	5/2.5	7.5/3.75	1500/750	750/375	432-9902004
300/150	400/200	10/5	15/7.5	3/1.5 kW	1.5/.75 kW	432-9902007

FOR GENERAL USE — (25-1000 CYCLES)

300/150	400/200	5/2.5	7.5/3.75	1500/750	750/375	432-9902013
300/150	400/200	5	7.5	1.5 kW	.75 kW	432-9901015

INDUSTRIAL CLASS PORTABLES

901 GROUP

¼ - ½ % ACCURACY

These modern styled instruments are used for general testing and for checking other meters in daily use in industry where easy reading and high shielding are desired. Long 5½" hand calibrated mirror scales combined with knife-edge pointers eliminate reading errors. Leather carrying cases are available, specify instrument model and catalog number — Price, leather case $30.00.

Size: 7½" x 7¼" x 3⅝" — 191 x 184 x 92 mm **Scale Length: 5½"**
D-C 901 — ¼% Accuracy — Self-Shielded
Permanent Magnet Moving Coil Type
A-C 904 — ½% Accuracy — Movable Iron Type
D-C/A-C 905 — ½% Accuracy — Dynamometer Wattmeters

VOLTS
D C
WESTON

Model 901

Model 904

D-C VOLTMETER — Model 901 (7 Range)

Range	Ohms Per Volt	Catalog Number
*750/300/150/75/30/15/3	5000	901-1905001

D-C AMMETER — Model 901

Range	Catalog Number
*50 mV/20/5/2 Amps	901-2904001

D-C MILLIAMMETER — Model 901

Range	Approx. Resis. Ohms	Catalog No.
*1000/500/200 mA 100/50/20/10	.049/.099/.244 .475/.9/1.88/2.5	(7 Range meter) 901-4905001
*100/50/20/10/5/2/1	1.49/2.96/7.28/14.1/26.4/52.5/60	(7 Range meter) 901-4905002

*¼% Accuracy.

(8 RANGE) A-C VOLTMETER — Model 904

Range	Approx. Resis. in Ohms	Catalog No.
750/300/150/75/30/15/7.5/3†	117,500/18,400/5180/1145/182/46/11.1/1.76	904-1906001

†In order to maintain rated accuracy on the lower voltage ranges, use leads having a total resistance of 0.026 ohms.

A-C VOLTMETER — Model 904

Range	Approx. Resis. in Ohms	Catalog No.
300/150	13600/6800	904-1903001
†600/300/150	27200/13600/6800	904-1904003
†750/300/150	34000/13600/6800	904-1904005

†Supplied with non-locking key in high range. This high range for intermittent duty only.

A-C AMMETER — Model 904

Range	Approx. Resis. Ohms	Catalog Number
5	0.015	904-2901001

(7 RANGE) A-C AMMETER — Model 904

Range	Approx. Resis. in Ohms	Catalog No.
200/100/50/20/10/5/2	.00019/.00025 .00044/.0058 .019/.076/.47	904-2905001

(6 RANGE) A-C AMMETER — Model 904

Range	Approx. Resis. Ohms	Catalog No.
50/20/10/5/2/1	.0014/.0055/.014/.058/.28/1.1	904-2905002

A-C MILLIAMMETER — Model 904

Range	Resis. Ohms	Catalog Number
150/75	16/64	904-4902001
*300/150	4/16	904-4902003

LEADS

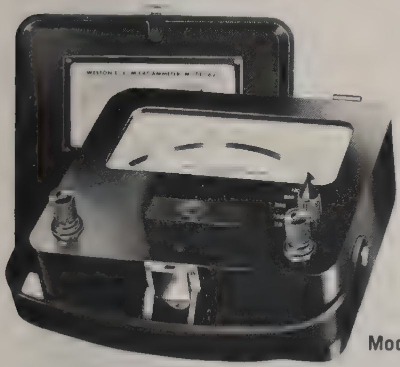
Model 9958
External Shunt Ammeters — Model 901 — one pair of five foot 40 x 30 braid rubber covered leads with forked terminals — both ends having 0.026 Ω Resistance.
Part No. 4516
Model 9995
Voltmeters — Model 901-904. Forked terminal at one end, test prod on other — 5 ft. long.
Part No. 254761-901

LEATHER CARRYING CASES FOR MODELS 901, 902, 904 & 905
All Orders for Carrying Cases must give the Model Number, type and range of the instrument for which it is intended.

INDUSTRIAL CLASS PORTABLES

MODEL 622

The Model 622 is a highly sensitive portable instrument especially adapted to a variety of laboratory requirements. Great flexibility is obtained by the use of range changing switches. Shielding is provided to minimize electrostatic and external magnetic field effects. Hinged cover protects instrument for portability. Mirror scales eliminate parallax.



Model 622

LEADS

Model 622 — External Shunt Ammeter:
One pair, 5 ft. long, rubber insulated leads 40 x 30 braid-covered. Forked terminals both ends. Resistance 0.026 ohms. Part No. 4516

Model 622 — Voltmeter:
One pair, 5 ft. long, insulated leads. Forked terminal on one end, test probe on other. Part No. 254761-901

LEATHER CARRYING CASE, P.N. 90675

Accuracy: ½ of 1%
Scale Length: 6.1″
Size: 8¾″ x 7¾″ x 4″ — 222 x 197 x 102 mm
Permanent Magnet Moving Coil Type

D-C VOLTMETER — MULTI-RANGE — Model 622
With Range Changing Switch and 2 Binding Posts

Range	Ohms Per Volt	Catalog Number
300/150/75/30/15/7.5/3/1.5	1000	622-1962001
750/300/150/75/30/15/7.5/3/1.5	1000	622-1962003
1000/500/200/100/50/20/10/5/2	1000	622-1962004

D-C MILLIVOLTMETER — MULTI-RANGE — Model 622
With Range Changing Switch and 2 Binding Posts

Range	Resis. Ohms	Catalog No.
50/20/10/5/2	250/100/50/25/10	622-9962002
1000/200/50/10/1	5,000/1000/250/50/5	622-9962007

D-C MILLIAMMETER — LOW RESIS. TYPE — Model 622
With Range Changing Switch and 2 Binding Posts

Range	Resis. Ohms	Catalog No.
100/10/1/0.1	0.20/1.98/18.4/40.0	622-4963002
500/50/5/0.5	0.10/1.0/9.8/80	622-4963004

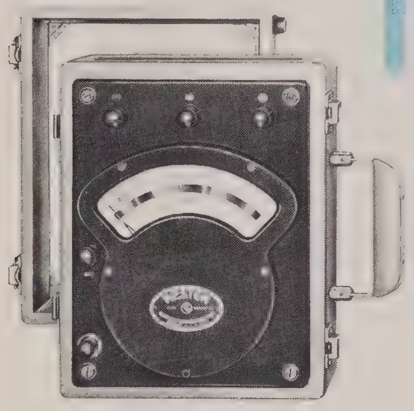
D-C MICROAMMETER — MULTI-RANGE — Model 622
With Range Changing Switch and 2 Binding Posts

Range	Resis. Ohms	Catalog No.
1000/500/200/100/50	96/184/400/600/400	622-5963002
1000/500/200/100/50	100 ohms all ranges	622-5963001

LABORATORY CLASS PORTABLE STANDARDS

AC/DC TRANSFER VOLTMETER STANDARD

MODEL 341


Model 341

Rated Accuracy 0.25% of Full Scale Value, Horizontal Position
Scale 5.25″ (133 mm)
Type: Electrodynamometer (Shielded from External Magnetic Fields)
Size: 8½″ x 10⅜″ x 5⅞″ — 216 x 264 x 147 mm
Approx. Weight: 11 lbs. — 5 kgs.
Power Consumption: (300/150 and 300/150/75 volt instruments)
150 volt range at 115 volts, 60 cycles — 4.0 watts, 4.0 volt-amperes

A true electrodynamometer, self contained, and suitable for d-c and a-c voltage measurements. All instruments are calibrated at 25°C (77°F). A certicate provided with each instrument supplies all essential data, true temperature correction factors and true frequency correction factors. Locking type contact key is supplied, except for the very low range instruments where contact key is omitted.

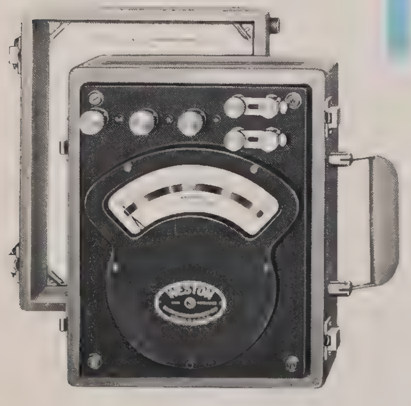
A-C/D-C VOLTMETERS — Model 341

	D-C and 25-125 Cycles	D-C and 25-1000 Cycles
Range	Catalog Number	Catalog Number
300/150		
300/150/75	341-1909002	341-1903002
600/300/150	341-1909003	341-1903001
750/300/150	341-1909001	

Leather Cases for Standard Ranges

AC/DC TRANSFER AMMETER STANDARD

MODEL 370


Model 370

Rated Accuracy 0.25% of Full Scale Value, Horizontal Position
Scale 5.25″ (133 mm)
Type: Electrodynamic (Shielded from External Magnetic Fields)
Size: 8½″ x 10⅜″ x 5¾″ — 216 x 264 x 146 mm
Approx. Weight: 10 lbs. — 4.5 kgs.
Power Consumption: 5 ampere range at 5 amperes, 60 cycles —
4.5 watts, 4.7 volt-amperes

Designed for a-c and d-c current measurements, these instruments are true electrodynamometers. All ranges above 0.5 ampere and all double range combinations are of the shunted moving coil type. All instruments are calibrated at 25°C (77°F) and have a rated accuracy of 0.25% of full scale value. A certificate provided with each instrument supplies all essential data.

They will measure true rms current on commercial wave forms since the wave form error is unreadable. Even under abnormal coditions, the wave form error is negligible.

A-C/D-C AMMETERS — Model 370

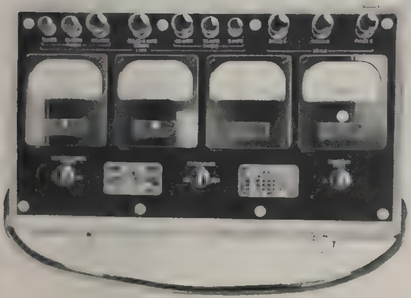
	D-C and 25-125 Cycles	D-C and 25-1000 Cycles
Range	Catalog Number	Catalog Number
1/5	370-2902005	370-2903001
5/2.5	370-2902003	370-2903003
10/5	370-2902002	370-2903005
20/10	370-2902001	

Leather Case for Standard Ranges

All meters are stock items. Any other practical range can be supplied.

GENERAL TESTING PORTABLES & MULTIMETERS

MODEL 639



Model 639 Type 2

A-C INDUSTRIAL ANALYZER

Size: 18⅞" x 10⅞" x 6⅞" – 479 x 276 x 175 mm **Weight:** 32 lbs.
Scale Length: 3.5" **Frequency:** 25-125 cycles

An accurate self-contained power analyzer for industrial maintenance men, utility service engineers, utility contractors, and those engaged in general industrial testing and installation work. Measures a-c current and voltage in single or polyphase circuits, as well as power factor in 3-phase balanced circuits. Uses four 4" by 4½" instruments. Voltmeter, ammeter and power factor meter accurate to 1%. Wattmeter within 2%. For measuring instantaneous current surges such as motor starting circuits, the ammeter has an adjustable pointer stop.

RANGES – TYPE 2 – 3 PHASE, 3 WIRE

Voltage: 600/300/150 volts
Current: 125/25/5 amperes
Watts: 100/50/25/20/10/5/4/2/1 Kilowatts
Power Factor: .30 lag through unity to .80 lead
Catalog Number 639-9900002

MODEL 785

Model 785 Type 11

INDUSTRIAL CIRCUIT TESTER

Size: 13" x 12½" x 5½" – 330 x 318 x 140 mm
Weight: 13½ lbs. **Scale Length:** 3.17"

A multipurpose industrial analyzer with 28 different ranges selected for maximum utility in checking of industrial electronic and industrial circuits. Current and potential leads connected simultaneously permit instantaneous current and voltage readings. D-C sensitivity 20,000 ohms per volt and A-C sensitivity 1,000 ohms per volt. Accuracy on all d-c ranges ±2%, except 1,000 volts which is ±3%; a-c volts is ±3%; a-c current is ±5%; ohms ±2% of linear arc length on any range.

A binding post connector is available at 100 millivolts so that external shunts may be used. For higher a-c current ranges (25-1500 amps) Model 785 can be connected to Weston Models 605 or 607 current transformer.

RANGES:

D-C Voltage: 1/10/50/200/500/1000
A-C Voltage: 5/15/30/150/300/750
D-C Current: 50 μa; 1/10/100 milliamps; 1/10 amps
A-C Current: .5/1/5/10 amps
Resistance: 3k/30k/300k/3M/30M full scale
(Ohms) 25/250/2.5k/25k/250k center scale
Available in polished wood or steel case
In polished wood case or
In steel case for bench use. Catalog No. 785-9900008

GENERAL TESTING PORTABLES & MULTIMETERS

MODEL 779

Model 779 Type 8

INDUSTRIAL ANALYZER — Model 779

Accuracy: a-c ±3%; d-c ranges ±2%,
±3% on 1,000 volt range; ohms ±2% of arc length
Size: 6⅜″ x 9⅛″ x 4⅞″ — 162 x 232 x 126 mm **Approx. Wt.:** 6 lbs.

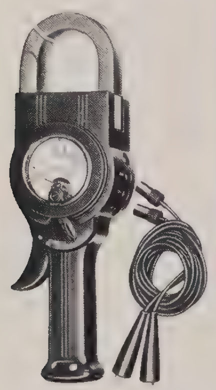
A compact 26 range sensitive analyzer with a sensitivity of either 1,000 or 20,000 ohms per volt. A-C voltage ranges are temperature compensated; uses precision resistors, having low inductance and distributed capacitance permitting use on audio frequencies up to 10,000 cps. "Output" jack provides convenient measurement of a-c voltages superimposed on d-c. Supplied in polished wood case with removable cover, carrying handle, test leads, instruction book. Also available as Type 9 with an impedance of 600 ohms when looking into a 1 volt range.

D-C Voltage:	2.5/10/50/250/1000
A-C Voltage:	2.5/10/50/250/1000
D-C Current Only:	.1 mA/1 mA/10 mA/50 mA/250 mA /1 Amp/10 Amp
Decibels*:	−14 to +2**/−2 to +14**/+12 to +28** +26 to +42†/+38 to +54††
Ohms:	0-3000/0-30,000/0-300,000/0-30 Meg

Price: Model 779 Type 8 Cat. No. 779-9900002
Model 779 Type 9 Cat. No. 779-9900004

*Zero power level is based on six milliwatts in a 500 ohm line.
**Substantially flat to 10,000 cycles.
†Substantially flat to 3,000 cycles.
††Substantially flat to 1,000 cycles.

MODELS 633-749



Model 633 Type VA-1

A-C CLAMP-AMMETER and VOLT-AMMETER Model 633

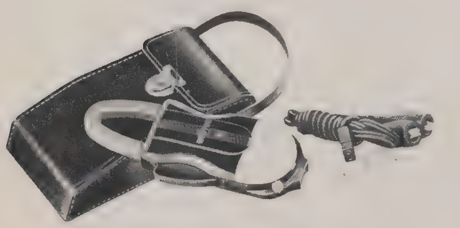
Accurate within 3% **Size:** 13⅝″ x 4⅜″ x 2½″ — 346 x 111 x 64 mm
Scale Length: 2.36″ **Weight:** 3¾ lbs.

OUTSTANDING FEATURES:

Non-Shatterable Glass
Adjustable Pointer Stop (Model 633 VA-1 only)
Safety Type Trigger
Insulated For 750 Volt Service
Can Be Hung On A Conductor, Leaving Operator's Hands Free
Accepts Conductors Up to 2″ In Diameter

RANGES:

Model 633 Type VA-1
Cat. No. 633-9901001 (Incl. Potential Leads) 1000/250/100/25/10 amperes a-c
700/350/175 volts a-c
Model 633 Type A-1
Cat. No. 633-2901001 500/250/100/50/25/10 amperes a-c
Model 633 Type A-2
Cat. No. 633-2901002 1000/500/250/100/25/10 amperes a-c
Model 633 Type A-3
Cat. No. 633-2901003 2000/1000/500/250/100/50 amperes a-c
Leather carrying case for types VA2, A1, A2, A3
Model 9959 - P/N 90856



Model 749

A-C CLAMP VOLT-AMMETER — Model 749

Accurate within 3% **Size:** 7½″ x 3″ x 1¼″ — 191 x 77 x 32 mm
Scale Length: 2.36″ **Weight:** 14 oz.

OUTSTANDING FEATURES:

Pocket Size
Precision Ground Faces Provide Positive Jaw Contact
Shatterproof Wrap-around Plastic Window
Uses Shock-mounted Core Magnet Mechanism
Fully Insulated for 750 Volt Services

Plug-in adapter, Model 9886, designed for use with Model 749, facilitates current measurements of double conductor leads without breaking the circuit. Used on direct reading or as a 10-to-1 divider for low current measurements. Simplifies voltage testing during current checks.

Model 749 (Ind. case, leads, battery, clips, probes)
Cat. No. 749-2901001 300/150/60/30/15/6 amperes a-c
600/300/150 volts a-c
Model 9886 Plug-in adapter — P/N 159983

GENERAL TESTING PORTABLES & MULTIMETERS

MODELS 980-911-912

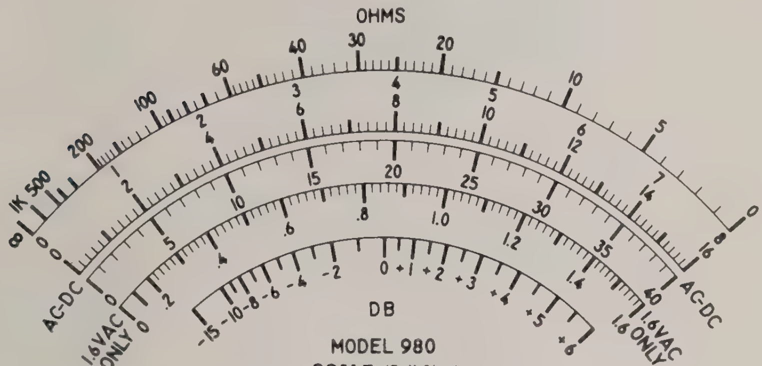
Model 980

ANALYZER-VOLT-OHM-MILLIAMMETER
Model 980

Accurate within 2% d-c; 3% a-c
Size: 7⁹⁄₁₆" x 6¼" x 3" — 192 x 159 x 77 mm
Scale Length: 4.63" Weight: 2 lbs., 8 oz.

FEATURES:

Spring Back Jewels for Maximum Shock Resistance
Fused Resistance Ranges
Fully Insulated Crackproof Case
Precision Components



MODEL 980
SCALE (Full Size)

RANGES:

D-C Volts: 1.6, 8, 40, 160, 400, 800, 4000 — at 20,000 ohms/volt
A-C Volts: 1.6, 8, 40, 160, 400, 1600 — at 1,000 ohms/volt
DB Range: —15 db to +54 db (in six ranges)
D-C Microamperes: 80
D-C Milliamperes: 1.6, 8, 80, 800
D-C Amperes: 8
Ohms: 5 range, 1 k to 10 Meg full scale, 25 ohms to 250 k center scale
Model 980 Mark II — Cat. No. 980-9900002
Combination cover and tilt stand
Model 9959 Leather Carrying Case — P/N 249350

Model 911

A-C or D-C INSTRUMENTS
Models 911, 912

Size: 7½" x 6½" x 2⅜" — 191 x 165 x 70 mm Scale Length: 7.2"
Weight: 5½ lbs. Core Magnet Moving Coil Type

ACCURACY:

±1% of full scale value on d-c voltmeters and milliammeters (±2% of full scale value on 300 and 1000 volts d-c); ±2% of full scale value on rectifier type a-c voltmeters 10 through 300 volts. ±3% of full scale value on rectifier type a-c voltmeters for 1000 volt range and 3 volt range above mid-scale.

FEATURES:

Combination Portable/Panel Instrument
Large 7.2" Mirrorback Scale With Knife Edge Pointer
Easily Read Scale With Maximum Natural Illumination
CORMAG® Self-Shielding Mechanism With Spring Back Jewels
Rugged, Compact Case
Large, Sure-Grip Knob On Range Switch

D-C VOLTMETER — Model 911

20,000 ohms per volt

Range (Volts)	Catalog Number
1000/300/100/30/10/3/1	911-1901001

D-C MILLIAMMETER**— Model 911

Range (mA)	Catalog Number
100/30/10/3/1/.3/.1	911-4901001

D-C AMMETER*— Model 911

Range	Catalog Number
10/3/1 (Amperes) 300/100/30/10 (mA)	911-9901001

**100 mA range has a drop of 500 mV. The 0.1 mA range has a 250 mV drop.

*The 10 mA range has a drop of 50 mV.

A-C VOLTMETER — Model 912

5,000 ohms per volt

Range (Volts)	Catalog Number
1000/300/100/30/10/3	912-1901001

A-C AMMETER — Model 912

Accuracy 2% of full scale value on all ranges. Transformer Rectifier Type. For use at 60-4000 cycle sinewave

Range	Catalog Number
5/2/1 (Amperes) 500/200/100/50 (mA)	912-2901002

GENERAL TESTING PORTABLES & MULTIMETERS

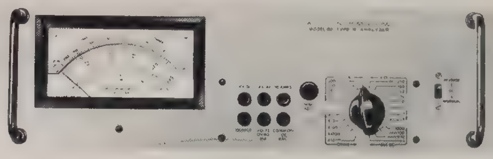
MODEL 80 SERIES

Model 80

MULTI-RANGE ANALYZERS

Scales and operating deck are both slanted at an ideal viewing angle, whether the operator is standing or seated. A large Weston 5½-inch meter is equipped with a unique refractive-type, anti-parallax scale which provides an unusual new approach to reading accuracy, regardless of lighting conditions. A single switch controls both functions and ranges.

The Model 80 Analyzer contains both fuse and diode circuitry to protect against overloads. It is equipped with a polarity reversing switch which may be operated even under load, and has provision for self-storing leads.



Model 80 Type R

SPECIFICATIONS

VOLT-OHM-MILLIAMMETER — Model 80

Accuracy: 1% D-C, 1.5% A-C; Ohmmeter—1% of Linear Scale; 1 & 5 kV—2% D-C and 2.5% A-C
Scale Length: 4.9″
Ranges: D-C Volts — 0.25 / 1 / 2.5 / 10 / 25 / 50 / 100 / 250 / 1 kV / 5 kV / @ 20,000 Ω / volt
A-C Volts — 2.5 / 10 / 50 / 250 / 500 / 1 kV / 5 kV / @ 5,000 Ω / volt
D-C Current — 50 μA / 1 / 10 / 100 mA / 1 and 10 amps
Ohmmeter — Five Ranges; 2 k to 20 meg, full scale; 20 to 200 k center scale
DB Scale — 10 to + 10 DB
Cat. No. 80-9008001

RACK MOUNTING — Model 80, Type R

Model 80 Type R for rack mounting has the same specification as Model 80 except that the 5,000 volt ranges have been eliminated.
Size: 19″ wide x 5¼″ high x 3½″ deep Cat. No. 80-9008002

D-C VOLTMETER — Model 81

Accuracy: 1% except 2.0% on the 1000 volt range
Scale: 50 divisions
Ranges: 0.25 / 1 / 2.5 / 5 / 10 / 25 / 50 / 100 / 250 / 1000
Sensitivity: 20,000 ohms per volt
Cat. No. 81-9008102

D-C MILLIAMMETER/AMMETER — Model 81

Accuracy: 1%
Scale: 100 and 60 divisions. NOTE: The 10 mA range has a drop of 50 mV so that the meter can be used with external shunts.
Ranges: 10 / 30 / 100 / 300 milliamperes, 1 / 3 / 10 amperes
Cat. No. 81-9008101

D-C MICROAMMETER/MILLIAMMETER — Model 81

Accuracy: 1%
Scale: 100 and 60 divisions
Resistance: 2500 / 1390 / 475 / 164 / 50 / 16.6 / 5 ohms
Ranges: .1 / .3 / 1 / 3 / 10 / 30 / 100 milliamperes
Cat. No. 81-9008103

A-C VOLTMETER — Model 82

Accuracy: 1.5% The combination of film resistors and selected germanium diodes results in temperature and frequency error usually less than 1% for a change of 10°C and frequencies from 25 to 2000 cycles. Ranges below 250 V are useable to 15 kc.
Scale: 50 divisions
Ranges: 2.5 / 10 / 50 / 250 / 1000 volts
Sensitivity: 5000 ohms per volt
Type: Rectifier Type
Cat. No. 82-9008201

A-C MILLIAMMETER/AMMETER — Model 82

Accuracy: 2% from 60 to 400 cps; from 25 to 1000 cps the frequency error is 1.5%. The instrument is useable to 5 kc.
Loss: From approx. 0.5 μA for the low ranges up to 1.5 μA for the 5 ampere range at 60 cps.
Scale: 100 divisions
Ranges: 50 / 100 / 200 / 500 milliamperes, 1 / 2 / 5 amperes
Type: Transformer — rectifier
Cat. No. 82-9008202

Leather Carrying Case Model 9959 PN250753
(for all meters above)

All meters are stock items. Any other practical range can be supplied.

GENERAL TESTING PORTABLES & MULTIMETERS

MODEL 2930

Model 2930

SINGLE PHASE POWER FACTOR METER

BENCH TESTERS

The 2930 Series comprises a group of A-C and D-C panel meters mounted in a sloped front mounting base constructed of high impact resistant plastic. These instruments are primarily designed for "bench testing" requirements both in educational and industrial laboratories.

The meters are supplied with standard scales and lance type pointer, except the null indicators, which have a knife-edge pointer and mirror dot at null.

A colored plastic insert is supplied on all units — yellow denotes a D-C unit and red an A-C unit.

FEATURES:

Top Quality Components for Long Service
Rugged Mechanism — Spring Back Jewels with Locking Nuts for Fine Adjustment
Sloped Panel for Ease of Reading
Large Scale — Readable at a Distance
Color Coded for D-C and A-C Applications
Zero Corrector Provided

D-C RANGES — Mod. 2931, Volts, Millivolts, Amps

Range	Sensitivity	Catalog No.
150/15/1.5 Volts	1000 Ω/V	2931-1722054
30/15/3 "	"	2931-1722053
30/3/1.5 "	"	2931-1722052
15 "	"	2931-1722051
50 Millivolts†	—	2931-9722058
30/3/1.5 Amps	—	2931-2721057
15 "	50 mV	
3 "	50 mV	2931-2721055

†Double Scale: 0-100, 50 divisions; 0-150, 75 divisions, captioned amperes d-c.

A-C RANGES — Model 2932 — Volts

Range	Sensitivity	Catalog No.
300/150/30 Volts	1000 Ω/V	2932-1722063
150/15/3 "	"	2932-1722062

A-C RANGES — Model 2934 — Amps

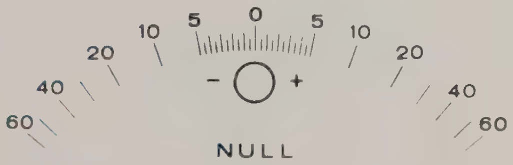
Range	Sensitivity	Catalog No.
30 Amps	.00056 Ω	2934-2722065
*5 "	.016 Ω	2934-2722064

*Double Scale: 0-100, 50 divisions; 0-150, 75 divisions, captioned amperes a-c.

NULL INDICATOR — Models 2931 and 2936

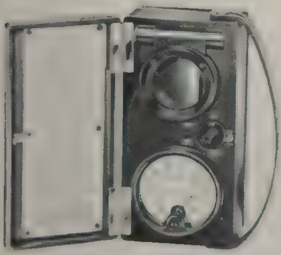
Scale	ua/Division	Catalog No.
30-0-30	2 µa/div.	2931-4721059
30-0-30	1 µa/div.	2936-4721060
60-0-60†	0.5 µa/div.	

†This unit has a special characterized mechanism (approx. Sq. Law). See Null — scale diagram below.



LIGHT MEASURING INSTRUMENTS

MODEL 614


Model 614 with Filters

FOOT-CANDLE METERS — Model 614

Size: 7⅜" x 3⅜" x 2¼" — 187 x 86 x 60 mm **Scale Length: 2.36"**
Weight: 1 lb., 13 ozs.

This unit is ideal for general commercial lighting surveys where wide ranges of light values exist. Completely self-contained, no outside power or batteries are required. Available for checking two different light situations.

VISCOR® filtered. 0-60/120/600 foot-candles, for visual correction for color.
Catalog Number 614-9960001.

VISCOR® and Cosine correction filtered, 0-100/250/500 foot-candles, for visual correction for color and direction correction.
Catalog Number 614-9960002.

LIGHT MEASURING INSTRUMENTS

MODEL 703

Model 703

SIGHTMETERS — Model 703

Size: 4⅝" x 2⅝" x 1$\frac{5}{16}$" — 117 x 67 x 32 mm **Scale Length: 1.57"**
Weight: 10 ozs.

This pocket-sized meter is ideal for checking illumination levels at work stations. It is available for checking three different light situations.
Leather case PN74472.

Unfiltered, Type 3A, 0-75 foot-candles.
Catalog Number 703-9960010.

VISCOR® filtered, Type 6A, 0-75 foot-candles, for visual correction for color.
Catalog Number 703-9960011.

VISCOR® and Cosine correction filters, Type 7, 0-100 foot-candles, for visual correction for color and direction correction.
Catalog Number 703-9960007.

Model 703 Type 8, 0-30 foot-candles with VISCOR® filter.
Catalog Number 703-9960009.

Model 703 Type 51, 0-150 foot-candles (with Quartz filter)—(For Ultra Violet use) Fluorescent characters & pointer on black background scale.
Catalog Number 703-9960051.

MODEL 756

Model 756 with Filters

ILLUMINATION METER — Model 756

A portable multi-range instrument with separable light target for light measurements requiring a high standard of accuracy over a broad range of light levels. All types of commercial lighting can be read directly. The separable PHOTRONIC® cell light target has a six foot cable. Instrument is supplied with sturdy leather case which also houses light target and cable.

0-20/100/500 foot-candles (with VISCOR® and cosine correction filters
Catalog Number 756-9901002.

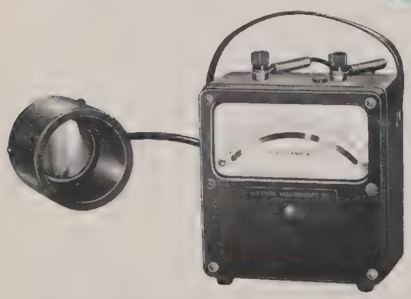
0-6/12/60/120/600 foot-candles (with VISCOR® filter)
Catalog Number 756-9901004.

SUNLIGHT ILLUMINATION METER
Model 756

This instrument incorporates ranges of 0-120/1200/12,000 foot-candles and requires only one PHOTRONIC® Cell equipped with a quartz filter so that the ultra-violet portion of the spectrum is included in the light measured. The extra high range coverage is ideally suited for making comparisons of natural sunlight intensities, or for any survey where high light intensities must be measured with a high degreee of accuracy.

Agricultural bureaus, schools and industry find this meter indispensable for studying the effect of sunlight on paint, textiles and numerous other products.
Model 756 0-120/1200/12,000 foot-candles (with Quartz Filter)
Catalog Number 756-9901003.

MODEL 759



Model 759

FOOT-LAMBERT METER — Model 759

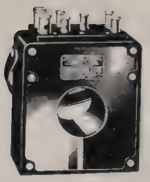
A versatile instrument for general brightness measurements, this instrument also meets the requirements of the television engineer as outlined by the Subcommittee on Phosphor and Optical Characteristics of the Joint Electron Tube Engineering Council. A VISCOR® filtered high output cell is used in conjunction with the very sensitive microammeter. The cell is equipped with a tubular baffle which restricts the oblique light and provides a basic range of 0 to 60 foot-Lamberts. A removable multiplier disc provides the second range of 0 to 300 foot-Lamberts.

In order to obtain optimum agreement between meters, a special set of lamps is maintained for the exclusive purpose of calibrating Model 759 Foot-Lambert Meters. By means of a specially calibrated filter, the meters are standardized at a color temperature of 6750 K. A calibration curve is furnished with each meter, but for maximum accuracy, meters should be standardized every six months.

Model 759, 0-60/300 foot-Lamberts including separable hooded light target with VISCOR® filter, removable multiplier disc and calibration curve.
Catalog Number 759-9901001.

TRANSFORMERS

MODELS 327-461-539


Model 327

Model 461

CURRENT TRANSFORMER — Model 327

Size: 9.93" x 8.38" x 3" — 252 x 213 x 76 mm
Approx. Weight: 12.5 lbs. — 5.7 kgs.
Inserted Primary Openings: 2.85" (72 mm) diameter

The high accuracy of Model 327 Current Transformers, which employ special nickel alloy cores, makes them ideal for laboratory as well as industrial uses. Type 2 differs from Type 1 in that it provides the maximum precision.

The unit is provided with a short circuiting switch and is housed in a black molded case with a leather carrying handle.

Range (Amps)	Type	Catalog No.
1200/600/400/ 300/200/100 50 20 10 Pri. to 5 Sec.	1	327-9901001
1200/600/400/ 300/200/100/ 50/20/10 Pri. to 5 Sec.	2	327-9902001

CURRENT TRANSFORMERS — Model 461

Size: 7.97" x 6.63" x 2.75" — 203 x 168 x 72 mm
Weight: Type 1—8 lbs.; Type 2—8.4 lbs.
Core Opening: 2.12"

Model 461 is a general purpose current transformer providing wide varieties of ranges in three types, with adequate accuracy for most industrial measurements. Four self-contained primary ranges are brought out to binding posts. A secondary short circuiting switch is provided. Black bakelite case.

Range (Amps)	Type*	Catalog No.
800/400/200/ 100/50/20/10 Pri. to 5 Sec.	1	461-9901001
800/400/200/ 100/50/20/10 Pri. to 5 Sec.	2	461-9902001

Range (Amps)	Type*	Catalog No.
1000/500/250/ 100/50/25/10 Pri. to 5 Sec.	1	461-9901002
1000/500/250/ 100/50/25/10 Pri. to 5 Sec.	2	461-9902002
500/250/100/ 50/25/10/5/ 2.5/1/0.5 Pri. to 5 Sec.	5	461-9902003

*Type 1 — Primarily used for Ammeter applications.
Type 2 — Primarily used for Wattmeter applications.
Type 5 — Similar to Type 2 except for additional ranges.

MINIATURE CURRENT TRANSFORMER — Model 539

Size: 5.49" x 4.1" x 1.88" — 140 x 104 x 48 mm
Approx. Weight: 3.0 lbs. — 1.4 kgs.
Inserted Primary Opening: 1.5" (38 mm) diameter

Model 539 is a small, lightweight, inexpensive transformer for use where only moderate accuracy is required with low burden ammeters having a range of one ampere. Ordinarily it cannot be used with a wattmeter since its phase angle, while satisfactory for current measurements, precludes its use for power measurements. Provided with a secondary short circuiting switch. Contained in a black molded case.

Model 539

Range (Amps)	Catalog No.
*200/*100/*50/ 20/10/5/2	539-9901001

*These ranges are obtained by inserting one, two, etc. turns, respectively, of the primary through the core opening; other ranges are on binding posts selected through a switch.

SHUNTS

MODEL 9992

Basic Shunt Accuracy ±0.2%

PORTABLE TESTING SHUNTS — Model 9992

Accurate Within ½ of 1% When Used with Models 901 and 931 (ammeters and milliammeters)

Adjusted to 50 Millivolts Drop

Portable Testing Shunts are intended for all general commercial testing and for use in the field, with any of the standard line of portable direct current ammeters. All of these shunts provide a 50 millivolt output at a given current (see tables). Shunts, including 30 amperes rating (50 mV output), can be driven by twice the normal rated current value to obtain a 100 millivolt output. The shunt will not be damaged and standard accuracy will be maintained. The shunts are adjusted for a 5 milliampere load. On ranges below 25 amperes (50 mV output), loading becomes an important factor of the overall accuracy and if it deviates greatly from the 5 milliampere figure, your order should specify the exact current load of the meter circuit.

For Use with 50 or 100 Division Scale Instruments

50 mV Range Amperes	100 mV Range Amperes	Approx. Weight Lbs.	Part Number
1	2	0.8	42261
2	4	0.8	42263
5	10	0.8	42210
10	20	0.8	41212
20	40	0.8	41932
25	–	–	41214
50	–	0.8	41218
100	–	1.0	41223
200	–	1.0	41227
500		1.5	25251

For Use with 75 or 150 Division Scale Instruments

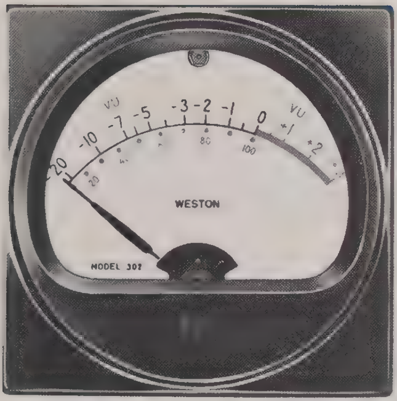
50 mV Range Amperes	100 mV Range Amperes	Approx. Weight Lbs.	Part Number
1.5	3	0.8	42262
3	6	0.8	42663
15	30	0.8	41213
30	60	0.8	41215
75	–	1.0	41221
150	–	1.0	41226
300	–	1.3	25237

All meters are stock items. Any other practical range can be supplied.

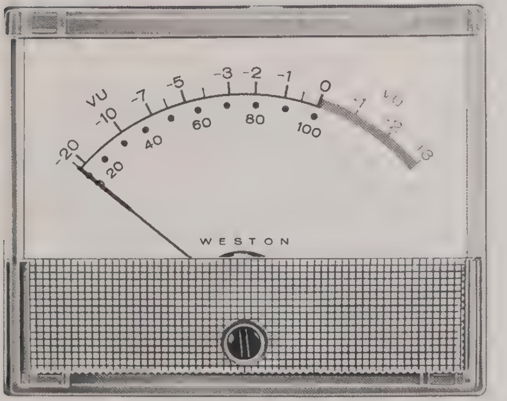
WESTON INSTRUMENTS DIVISION
WESTON INSTRUMENTS, INC.
614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
a Schlumberger company

WESTON®

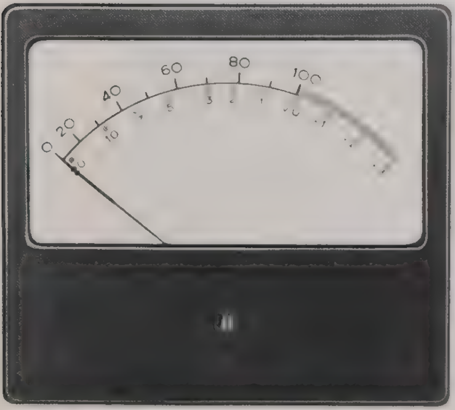
VOLUME LEVEL METERS



MODEL 302 TYPE 30 A



MODEL 1932 TYPE 30 A



MODEL 1942 TYPE 30 B

The VU meter has become the standard level indicator for audio frequency transmission systems associated with broadcasting in both AM and FM, voice channel in television, telephone, and recordings. It is also used for the measurement of noise level and other audio frequency energy where established dynamic characteristics of the instrument give a common result for measurements. The VU meter was developed by Weston and engineers of broadcasting and communication groups.

Weston VU Meters are available with a choice of two (2) scales (except 1922 and 1932). Type A stresses the level in VU and is used largely in monitoring wire lines. Type B emphasizes percent use of transmitter output and is the standard for broadcast service. The VU meter is designed to read zero VU or 100% with 1.228 volts applied to the meter and a 3600 ohms series resistor. This represents 4 DB above 1 MW in 600 ohms.

VOLUME LEVEL METERS

Model 302	**Type 30**	(Scale A or B)	Phenolic Case
Scale A	Rd./302-3301101		
Scale A	Sq./302-3601101		
Scale B	Rd./302-3301102		
Scale B	Sq./302-3601102		
Model 1922	**Type 30**	(Scale A)	Phenolic or Plastic Front
Scale A	Sq./1922—3621001		
Model 1932	**Type 30**	(Scale A)	Phenolic or Plastic Front
Scale A	Sq./1932—3621001		
Model 1942	**Type 30**	(Scale A or B)	Phenolic or Plastic Front
Scale A	Sq./1942—3621001		
Scale B	Sq./1942—3621002		

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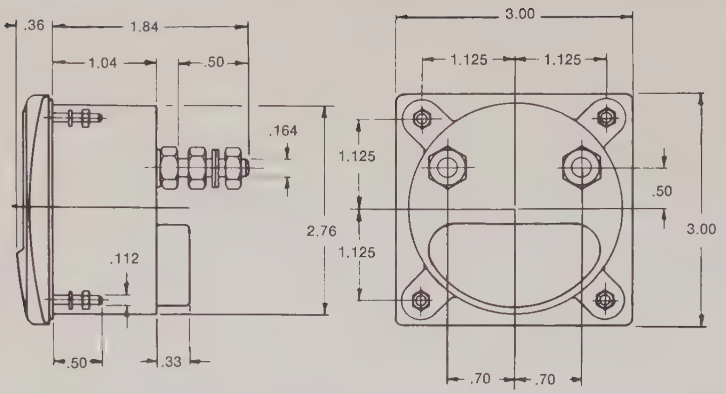
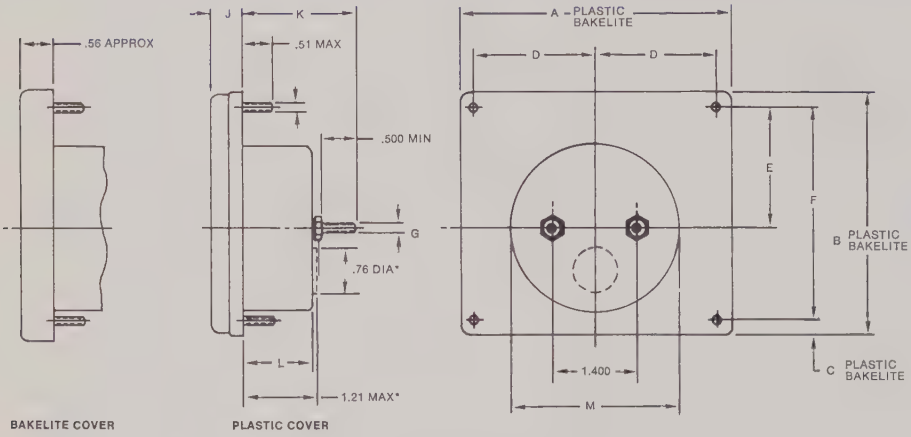
DIMENSIONS

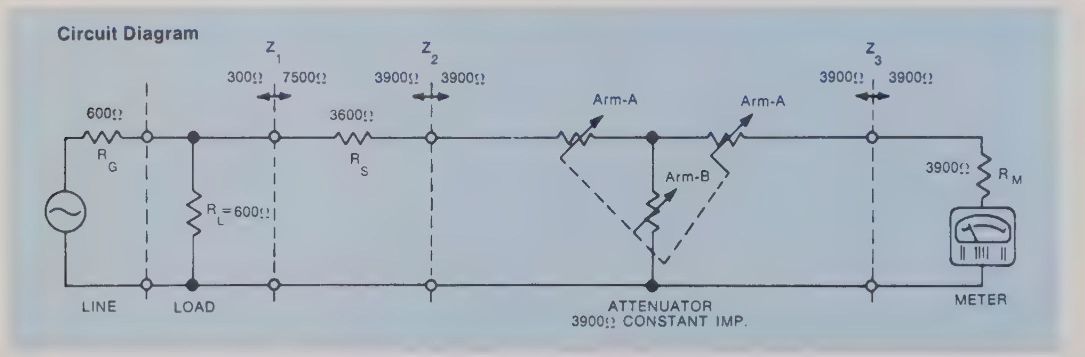

.36
1.84
1.04
.50
.164
1.125
2.76
1.125
.112
.50
.33
3.00
1.125
1.125
.50
3.00
.70
.70

MODEL 302 TYPE 30 A


.56 APPROX
J
K
.51 MAX
.500 MIN
G
.76 DIA*
L
1.21 MAX*
BAKELITE COVER
PLASTIC COVER
A – PLASTIC BAKELITE
D
D
E
F
B PLASTIC BAKELITE
1.400
M
C PLASTIC BAKELITE

***Models 1932 & 1942 Dimensions**

Model	PLASTIC COVER			BAKELITE COVER			D	E	F	G Thd Size	H Thd Size	J	K	L	M
	A	B	C	A	B	C									
1932	3.51 max	2.99 max	.312	3.66 max	3.14 max	.391	1.125	1.125	2.250	#8-32	#4-40	.56 max	1.91 max	1.15 max	2.76 max
1942	4.53 max	4.07 max	.250	4.68 max	4.22 max	.320	2.000	2.020	3.560	#8-32	#6-32	.56 max	1.91 max	1.15 max	2.76 max


Circuit Diagram

Z_1
300Ω 7500Ω
Z_2
3900Ω 3900Ω
Z_3
3900Ω 3900Ω
600Ω
R_G
3600Ω
R_S
Arm-A
Arm-A
Arm-B
R_L=600Ω
3900Ω
R_M
LINE
LOAD
ATTENUATOR
3900Ω CONSTANT IMP.
METER

WESTON INSTRUMENTS DIVISION
WESTON INSTRUMENTS, INC.
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WESTON®

prime
source for precision
. . . since 1888

WESTON THIN LINE PANEL METER
MODEL 111 (1½″)

PANEL
SWITCHBOARD

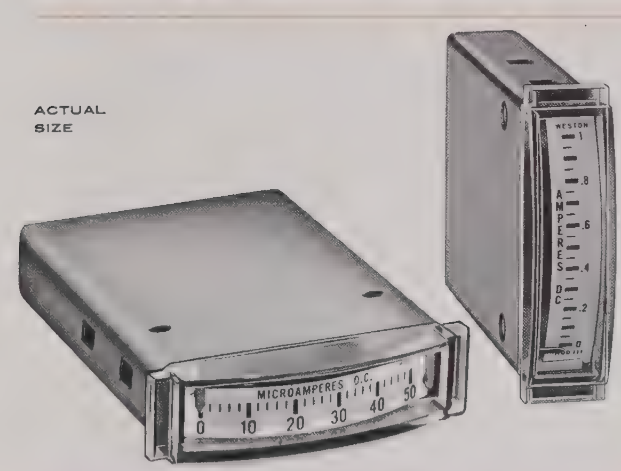
CIRCULAR 01-116-E
FEBRUARY 1968
Supersedes 01-116-D

Completely Flat–Can Be Stacked Side-by-Side

New Self-Shielded Mechanism

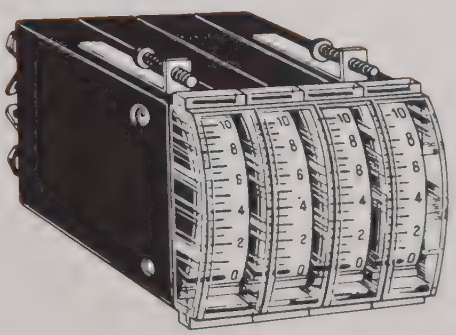
Saves Panel Space

Designed to Meet ASA C39.1 Specifications



ACTUAL SIZE

The introduction of the Weston Model 111 thin line meter marks the entrance of Weston into the commercial edgewise instrument market. However, Weston has been supplying edgewise meters for many years on a special design basis. A fact that is not generally known in the commercial market is that present space vehicles utilize Weston edgewise instruments on their instrument panels—this background assures the best quality and reliability available. ■ The Model 111 utilizes a completely new mechanism design. This is the only edgewise instrument incorporating a flat cormag mechanism design for shielding purposes. The magnet is inside the moving coil as in all Weston CORMAG® designs and the resulting inherent shielding allows mounting on magnetic or nonmagnetic panels without need for adjustment, as well as the ability to "stack" meters side-by-side without any interaction. The mechanism also has a shock absorption jewel arrangement to assure long life.



SPECIFICATIONS

Accuracy: 2% of full scale value for DC (Model 111) 3% of full scale value for AC Rectifier Type (Model 112)

Scale Length: 1.24 inches

Pointer: Red Lance Type

Movement: New self shielded thin line CORMAG® mechanism. Shock mounted jewel arrangement.

Ranges: Voltage: 50 mv minimum
300 volts maximum
self-contained

Current: 50 ua minimum
2 amps maximum
self-contained

Mounting: Meter can be mounted either horizontally or vertically. Order proper meter from price list for the required type mounting. Most ranges stocked for horizontal mounting.

Mounting clips fasten to meter behind panel—no screws show on front of panel. For "stacking," thru-holes are provided so stack can be bolted together.

RANGES

DC VOLTMETERS (Model 111)	**RESISTANCE**
0-10	5000 Ω/v
0-25	5000 Ω/v
0-50	5000 Ω/v
0-100	5000 Ω/v
0-150	5000 Ω/v
0-300	5000 Ω/v

DC MILLIAMMETERS (Model 111)	**RESISTANCE**
0-1	39 Ohms
0-5	5.2 Ohms
0-10	2 Ohms
0-25	2 Ohms
0-100	.5 Ohms
0-150	.33 Ohms
0-250	.20 Ohms
0-500	.10 Ohms

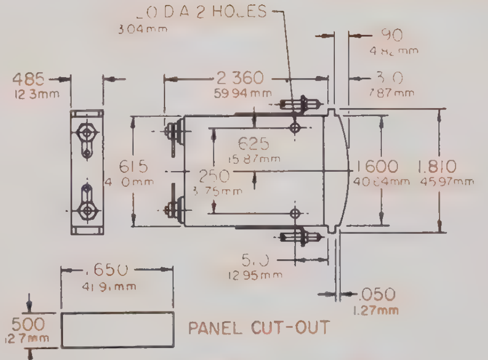
DC MICROAMMETERS (Model 111)	**RESISTANCE**
0-50	2300 Ohms
0-100	900 Ohms
0-200	600 Ohms
0-500	134 Ohms
50-0-50	900 Ohms

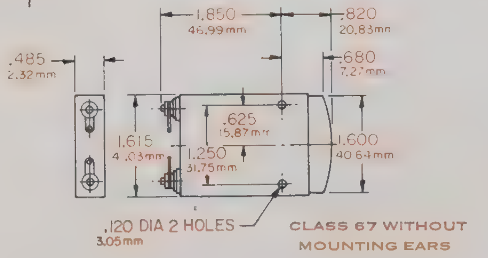
DC AMMETERS (Model 111)	**RESISTANCE**
0-1	.05 Ohms

AC VOLTMETERS (Rectifier Type) (Model 112)	**RESISTANCE**
0-150	2000 Ω/v
0-300	2000 Ω/v

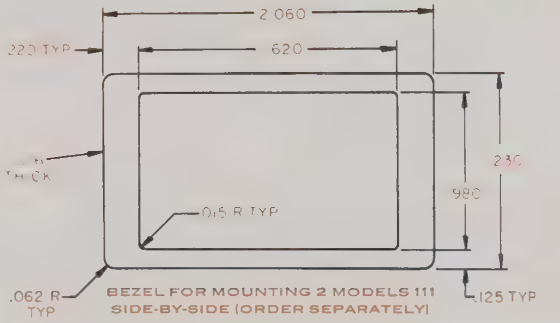
All resistances are approximate

ALL DIMENSIONS ARE APPROXIMATE.

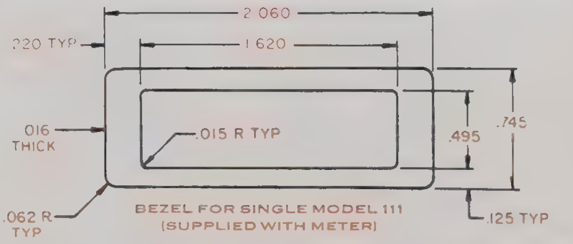

.120 DIA 2 HOLES
3.04mm
.190
4.82mm
.485
12.3mm
2.360
59.94mm
.310
7.87mm
.625
15.87mm
1.615
41.0mm
1.250
31.75mm
1.600
40.64mm
1.810
45.97mm
.510
12.95mm
1.650
41.91mm
.050
1.27mm
.500
12.7mm
PANEL CUT-OUT


1.850
46.99mm
.820
20.83mm
.485
12.32mm
.680
17.27mm
.625
15.87mm
1.615
41.03mm
1.250
31.75mm
1.600
40.64mm
.120 DIA 2 HOLES
3.05mm

CLASS 67 WITHOUT MOUNTING EARS


2.060
.220 TYP
1.620
.016 THICK
.015 R TYP
.980
1.230
.062 R TYP
.125 TYP

BEZEL FOR MOUNTING 2 MODELS 111 SIDE-BY-SIDE (ORDER SEPARATELY)


2.060
.220 TYP
1.620
.016 THICK
.015 R TYP
.495
.745
.062 R TYP
.125 TYP

BEZEL FOR SINGLE MODEL 111 (SUPPLIED WITH METER)

WESTON INSTRUMENTS DIVISION
WESTON INSTRUMENTS, INC.
614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
a Schlumberger company

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WESTON®
prime
source for precision
. . . since 1888

WESTON FLAT SCALE EDGEWISE PROJECTED MOVING POINTER

MODEL 1201 SERIES

PANEL
SWITCHBOARD

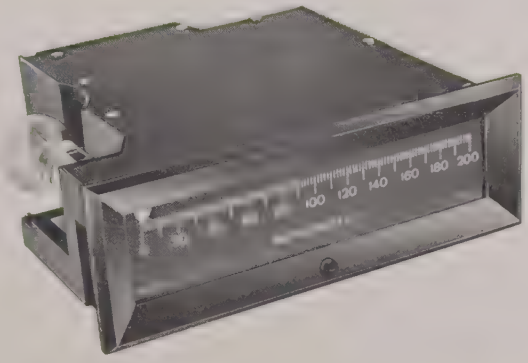
CIRCULAR 01-117F
MARCH, 1968

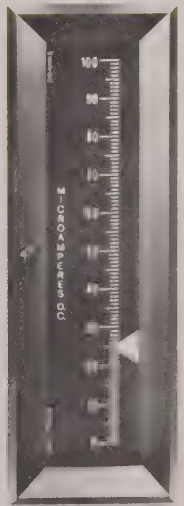
Supersedes 01-117-E

- True Flat Scale Presentation
- Shielded Cormag or External Magnet Mechanism
- 1% Accuracy (Horizontal or Vertical) (½% Available)
- Thermosetting Plastic Case with Glass Window
- 2 u a Full Scale Sensitivity Available
- Designed to Meet ASA C39.1
- 10,000 Hours Bulb Life
- No Parallax
- All Glass Optical System
- Variable Pointer Colors Available

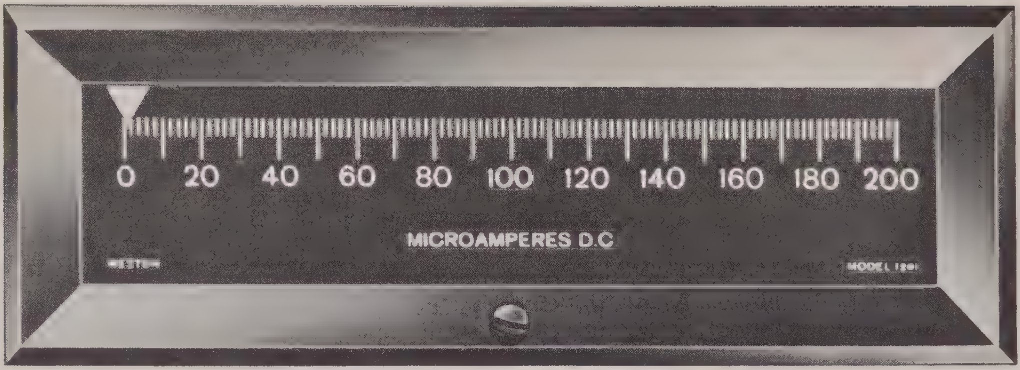
The Weston Model 1201 for the first time offers a true flat scale edgewise instrument at a price comparable to mechanical pointer types. The projection path is so arranged that an essentially linear scale is obtained. The standard projected pointer will appear white but can be colored on special order. ■ Since the pointer is projected on the same plane as the scale division parallax is completely eliminated. Several meters can be monitored by a single TV camera without fear of parallax problems. ■ The thermosetting plastic case, glass optics, glass window, and rugged 15,000 hour lamp assure trouble free service plus all the advantages of a flat scale. This meter can be used to measure various functions through the use of standard Weston transducers and therefore will find many applications on industrial switchboards as well as electronic equipment. The choice of either horizontal or vertical mounting leaves the designer free to choose the best style for his needs. ■ CORMAG® mechanism is inherently self-shielding; metal covers shield the external magnet mechanism. These units will be unaffected by panel material, normal magnetic fields created by current carrying conductors and can be mounted side-by-side with no loss of accuracy.

Special Feature: Filters may be placed behind the scale so that the pointer will change color at a fixed point. Up to two colors (plus a white pointer area) can be provided. Standard colors are red, green or amber. Also available with illuminated scale.





ACTUAL
SCALE SIZE
MODEL 1201


0
20
40
60
80
100
120
140
160
180
200
MICROAMPERES D.C
WESTON
MODEL 1201

SPECIFICATIONS

Accuracy: 1% of full scale value*
2% of full scale value for AC Rectifier
*½% available (horizontal only)

Scale Length: 4½ inches
Scale Color: White figures and divisions on black background.

Pointer: White, triangular shape. Colored pointers available.

Movement: Models 1201 and 1202—self-shielding CORMAG mechanism. Model 1206—external magnet mechanism.

Ranges: 2 Microamperes through 50 Amperes DC self-contained/50 Millivolts through 500 Volts DC self-contained/Rectifier and Thermo RF types available.

Mounting: Horizontal or Vertical. Specify mounting position when ordering. Most ranges stocked for horizontal mounting.

No mounting screws are visible from front of the panel—two clips behind the panel securely lock the meter in place.

Lamp: G.E. No. 82 operated at 5 volts, 1.0 amps, ac or dc, 15,000 hours minimum expected life.

Scale Illumination Lamp: G.E. No. 212 operated at 5 volts, .34 amps, rated at 60,000 hours.

RANGES

DC AMPERES (Model 1201)
Ranges up to 50 Amps can be self-contained. For higher ranges meters with approx. 50 mv drop can be supplied for use with standard switchboard shunts.

DC MILLIAMPERES (Model 1201)	RESISTANCE
0-1	18.8
0-10	2.3
0-20	5.0
0-50	2.0
0-500	0.2

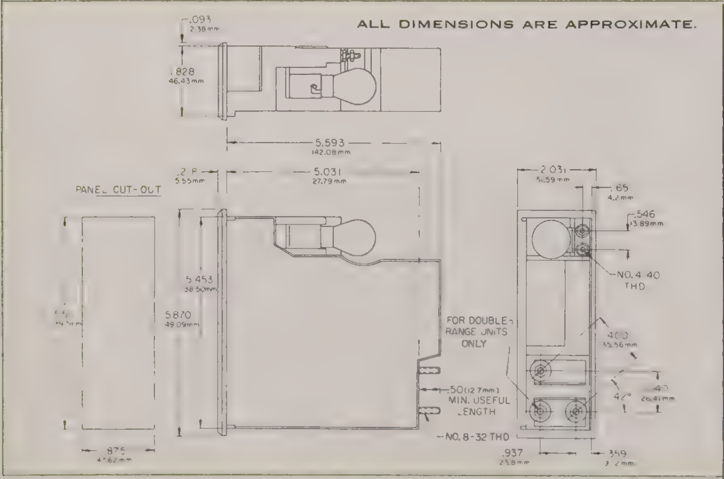
DC MICROAMPERES (Model 1206)	RESISTANCE
0-2 (taut band suspension)	13,750
0-5 (taut band suspension)	2,180
0-10 (taut band suspension)	1,850
0-20 (pivot and jewel mechanism)	5400

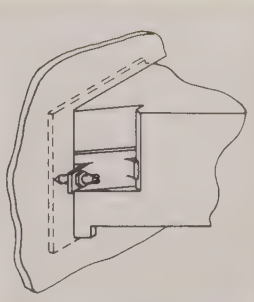
DC MICROAMPERES (Model 1201)	RESISTANCE
0-50	2300
0-100	640
0-200	415
0-500	88
50-0-50	640

DC VOLTS (Model 1201)	RESISTANCE
0-1	1000 Ohms/Volt
0-5	1000 Ohms/Volt
0-10	1000 Ohms/Volt
0-20	1000 Ohms/Volt
0-50	1000 Ohms/Volt
0-100	1000 Ohms/Volt
0-500	1000 Ohms/Volt

AC VOLTS (rectifier type) (Model 1202)	RESISTANCE
0-150	1000 Ohms/Volt
0-300	1000 Ohms/Volt

All resistances are approximate


ALL DIMENSIONS ARE APPROXIMATE.
.093
2.38mm
.828
46.43mm
5.593
142.08mm
.2 F
5.55mm
5.031
27.79mm
PANEL CUT-OUT
5.453
38.50mm
5.870
49.09mm
.875
47.62mm
2.031
51.59mm
.65
4.2mm
.546
13.89mm
NO. 4 40 THD
FOR DOUBLE RANGE UNITS ONLY
400
35.56mm
.50 (12.7mm) MIN. USEFUL LENGTH
42°
26.41mm
NO. 8-32 THD
.937
23.8mm
.359



No mounting screws are visible from front of the panel—two clips behind the panel securely lock the meter in place.

WESTON INSTRUMENTS DIVISION

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a Schlumberger company

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WESTON®

prime
source for precision
...since 1888

PMS Instrument

Projected Moving Scale

1209 SERIES

PANEL
SWITCHBOARD

CIRCULAR 01-119-B
OCTOBER, 1967

Supersedes 01-119-A

Compact – 88% less panel space than equivalent pointer-type meters.

No parallax – hairline on same plane as projected image

Large scale – 8 inches long

Excellent readability – up to 150 scale divisions

Front bulb removal – standard #44 lamp is available anywhere

Self-shielded CORMAG® mechanism with spring-back jewels offers proved design

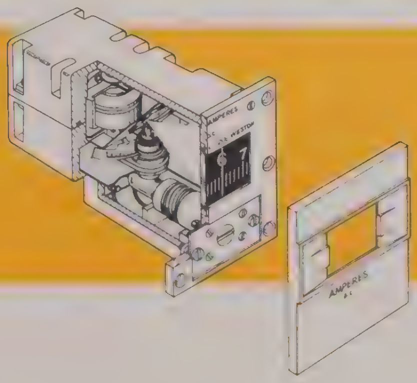
Pivot roll eliminated – mechanical axis of mechanism is vertical

Flexible design for custom application – instrument may be front-panel or recess mounted

Glass lenses in optical system

Tongue and groove joints in the case seal out dust

Fully meets ASA C39.1 requirements



MILLIAMPERES
D C
WESTON

The Weston PMS (Projected Moving Scale) Instrument Model 1209

The Weston PMS (Projected Moving Scale) Meter marks a significant advancement in analog display of electrical values. A standard Weston CORMAG mechanism of proved design and reliability has been coupled with a simple optical system to provide superior performance with a considerable reduction in panel space requirements.

This new instrument essentially miniaturizes the equivalent of a 7″ x 9″ (63 sq. in.) standard pointer-type meter into a 2½″ x 3⅛″ (8 sq. in.) front panel presentation. In addition, the new PMS instrument eliminates parallax errors associated with pointer-type meters.

For the first time, designers can standardize on one meter of which fills the complete range of requirements — small size, long scale length, accuracy, self illumination, versatility in styling. With Weston's new PMS instrument, equipment dimensions can now be based on optimum space requirements rather than on meter size.

Scales are available with either black figures on a white background or white figures on a black background. Standard 100 division scales can be supplied figured 0-1, 0-2, 0-5, 0-10, 0-20, 0-50, 0-100, 0-200 and 0-500; other scales are available on special order. Special scale requirements may be evaluated through the use of a do-it-yourself scale layout kit (ask for Z-90) which allows the scale to be viewed as it appears in an actual Model 1209.

Special captions may be obtained on special order or the bezel may be blank. Scale captions such as, "Milliamperes, DC" are standard on the black "snap-on" bezel, unless otherwise specified.

Future application possibilities for this unique line of panel instruments are limited only by the designer's imagination.

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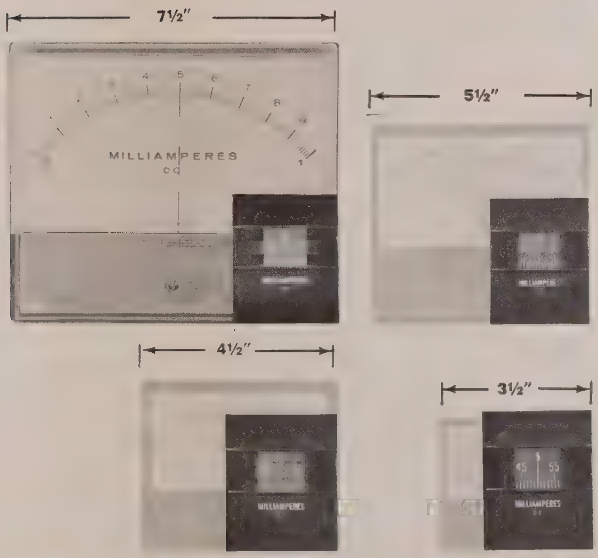
STYLING VERSATILITY

The PMS meter presents the designer with a truly flexible tool. Standard mounting is much the same as a conventional panel meter. The front bezel is snapped into place from the front. It can be removed quickly for easy replacement of the lamp.

For styling purposes, special bezels can be supplied to customer's own design, with molded-in markings and signatures. The unit can also be rear mounted so that customers can supply their own masking frame — with or without front access to lamp housing.

COMPARABLE SIZE

The PMS Model 1209 is a lot of instrument in a small package. It has a longer scale than a standard 7½″ meter, for example, yet it requires 88% less panel mounting space. The PMS scale is 8 inches long, while the conventional 7½″ meter has a scale length of only 7.2 inches.



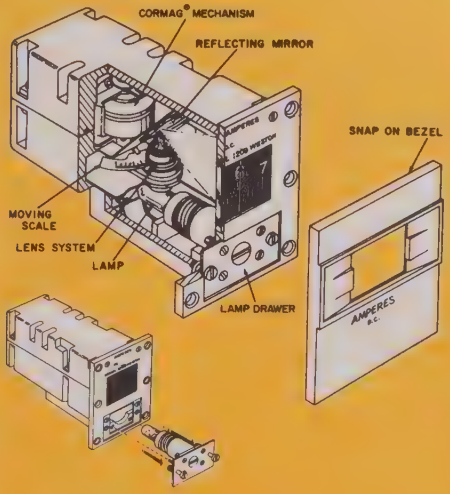
Standard Captions Available

Degrees C	Millivolts	Amperes	x 100
Degrees F	Volts	DC	PSI
Microamperes	RPM	AC	Position
Milliamperes	Pounds x 10	x 10	Feet x 1000

Special captions available upon request. For additional information on captions or available scales, contact factory or local field office.

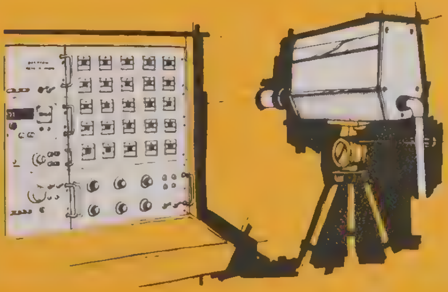
How the PMS Works

A simple optical system projects a moving scale onto a coated window. The scale is rotated by a self-shielded Weston Cormag mechanism of proved design and reliability. Pivot roll is eliminated in PMS panel meters, because the mechanical axis is vertical.



Parallax Eliminated

The complete elimination of parallax allows viewing from oblique angles without loss of accuracy. For the first time, a panel can be monitored by TV cameras without loss of readability or need for auxiliary lighting.



[illegible]

Accuracy: 1% standard (½% available) for DC ranges.
2% for rectifier type.

Movement: Standard Weston CORMAG mechanism of the self-shielded type

Scale length: Approximately 8″ long

[illegible]

Ranges: Voltage: 50 mv, minimum;
500 v, maximum (self-contained)
Current: 50*u*a, minimum;
20 amps, max. (self-contained)

Lamp: Standard #44 bulb (6-8 volts)*

*It is recommended that General Electric #44 bulbs be used for best performance.

[illegible]

[illegible]

DC MICROAMMETERS	APPR. INT. RESISTANCE (IN OHMS)	DIVISIONS
50 *u*a	5,700	100
100 *u*a	1,066	100
50-0-50 *u*a	1,066	100
200 *u*a	231	100
500 *u*a	73	100
DC MILLIAMMETERS		
1 ma	21.0	100
2 ma	8.6	100
5 ma	3.96	100
10 ma	2.3	100
20 ma	2.2	100
50 ma	2.0	100
100 ma	1.0	100
200 ma	.5	100
500 ma	.2	100
DC VOLTMETERS		
1 v	1,000 Ω/v	100
2 v	1,000 Ω/v	100
5 v	1,000 Ω/v	100
10 v	1,000 Ω/v	100
20 v	1,000 Ω/v	100
50 v	1,000 Ω/v	100
100 v	1,000 Ω/v	100
200 v	1,000 Ω/v	100
500 v	1,000 Ω/v	100
DC MILLIVOLTMETERS		
50 mv	5	100

*Most ranges in stock.

[illegible]

[illegible]

DC AMMETERS	MV DROP	DIVISIONS
1	50 mv	100
2	50 mv	100
5	50 mv	100
10	50 mv	100
20	50 mv	100

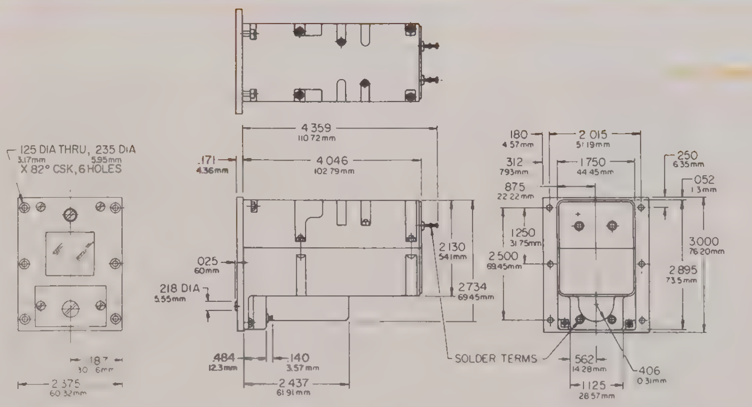
[illegible] **(RECTIFIER TYPE)**

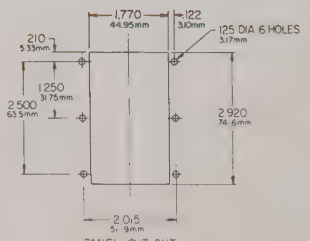
AC MICROAMMETERS	INT. RES.	(2% Accuracy)
100	3,700	100
200	1,600	100
500	630	100
AC MILLIAMMETERS		(2% Accuracy)
1	450	100
2	250	100
5	134	100
AC VOLTMETERS		(2% Accuracy)
2	1,000 Ω/v	100
5	1,000 Ω/v	100
10	1,000 Ω/v	100
50	1,000 Ω/v	100
100	1,000 Ω/v	100
150	1,000 Ω/v	100
200	1,000 Ω/v	100
300	1,000 Ω/v	100
500	1,000 Ω/v	100

[illegible] **THERMOCOUPLE** (2% Accuracy)

TYPE RF AMMETER	(Std. Square Law Scale)	
1	.26	100
2	.12	100
5	.04	100
10	.02	100

[illegible]


125 DIA THRU, 235 DIA
3.17mm 5.95mm
X 82° CSK, 6 HOLES
187
30 6mm
2 375
60 32mm
4 359
110 72mm
.171
4.36mm
4 046
102 79mm
025
60mm
218 DIA
5.55mm
2 130
541mm
2734
6945mm
.484
12.3mm
.140
3.57mm
2 437
61 91mm
SOLDER TERMS
180
4 57mm
2 015
51 19mm
312
793mm
1750
44 45mm
875
22 22mm
250
6 35mm
052
1 3mm
1250
31 75mm
2 500
6945mm
3.000
76 20mm
2 895
73.5mm
562
14 28mm
406
0 31mm
1125
28 57mm


1.770
44.95mm
.122
3.10mm
125 DIA 6 HOLES
3.17mm
210
5 33mm
1250
31 75mm
2 500
63 5mm
2 920
74 6mm
2 015
51 9mm

PANEL CUT-OUT

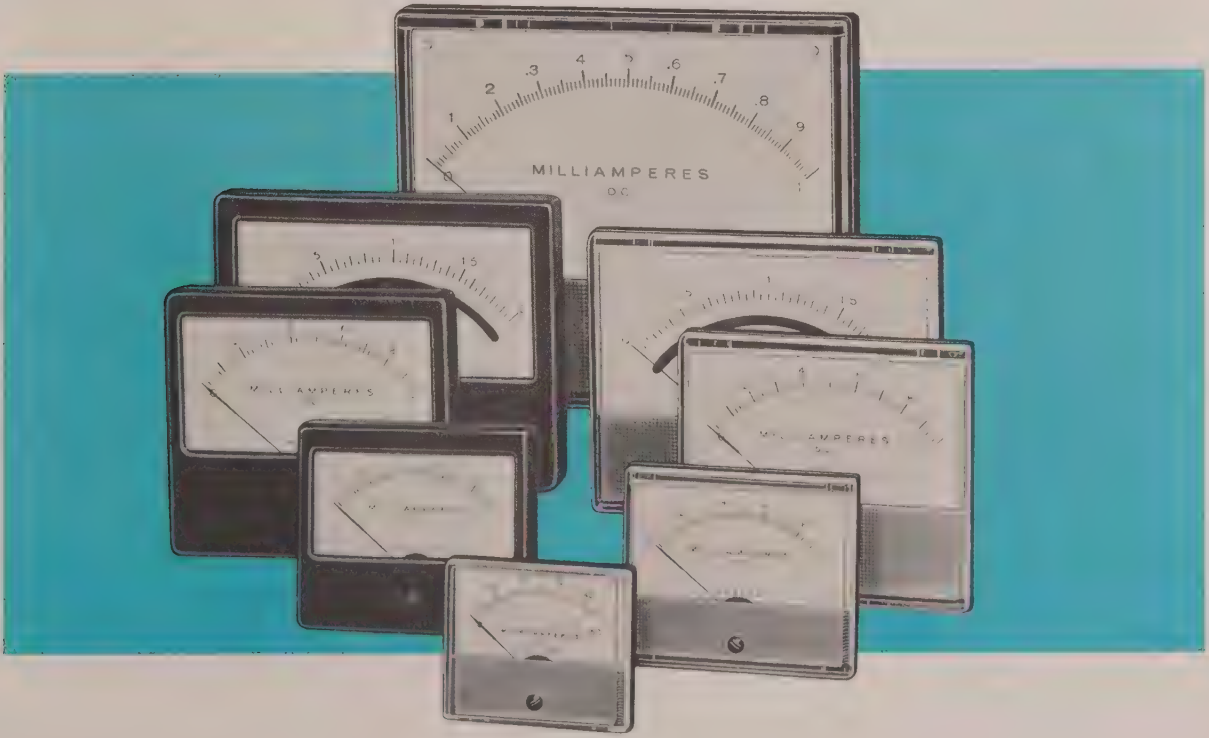
WESTON INSTRUMENTS, INC.
WESTON—NEWARK DIVISION 614 Frelinghuysen Avenue, Newark, New Jersey 07114
a Schlumberger company

PRINTED IN U.S.A.

WESTON®

1900 Series Panel Meters

- Standardized in appearance so all sizes match.
- Clear plastic and Bakelite fronts are readily interchangeable.
- 2% accuracy with plain scales and lance pointers or 1% accuracy with mirrored scales and knife-edge pointers in all practical sizes.
- Taut Band Mechanism with Co-planar* termination.
- Fronts are securely fastened to the shell by unique clips which eliminates unsightly surface screws.
- Plastic fronts are STATNUL* treated to remain dust and static-free, to assure correct and legible readings.
- Available in A-C, D-C, Rectifier and Thermo types in 1½″, 2½″, 3½″, 4½″, 5½″ and 7½″ sizes.
- Pivot and Jewel Mechanisms use spring back jewels with locking nuts for fine adjustment.
- Specially treated Alnico 5 magnets provide long term stability.
- Die-cast parts in critical structural members provide complete interchangeability and permanent alignment.
- Entire assembly of base, mechanism and scaleplate can be removed from the shell for ease of servicing, adjustment, repair, or replacement.
- Designed for minimum power consumption—minimum response time.
- Dielectric test meets ASA C39.1.
- Zero correctors are provided on all Standard Model 1900 Series instruments.
- Available in three types of mounting . . . Recess . . . Flush . . . Conventional.



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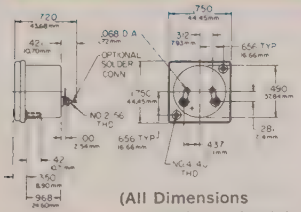
SPECIFICATIONS	Function & Mechanism	Accuracy (full scale value)	Scale Length (100° arc)	Pointer	Type Scale	Case Front
1½″ SIZE						
Model 1911	D-C Ext. Mag.	Self-Shielding Metal Case 2%	1.37″	Lance	Plain	Plastic Only
Model 1912	Rect. Ext. Mag.	Self-Shielding Metal Case 3%	1.37″	Lance	Plain	Plastic Only
2½″ SIZE						
Model 1921	D-C CORMAG®	2%	2.3″	Lance	Plain	Plastic/Bakelite
Model 1922	Rect. CORMAG	3%**	2.3″	Lance	Plain	Plastic/Bakelite
Model 1924	Iron Vane	2%	2.3″	Lance	Plain	Plastic/Bakelite
3½″ SIZE						
Model 1931	D-C CORMAG	2%	2.7″	Lance	Plain	Plastic/Bakelite
Model 1932	Rect. CORMAG	3%**	2.7″	Lance	Plain	Plastic/Bakelite
Model 1934	Iron Vane	2%	2.7″	Lance	Plain	Plastic/Bakelite
Model 1936	D-C Ext. Mag.	2%	2.7″	Lance	Plain	Plastic/Bakelite
Model 1938	Thermo. Ext. Mag.	2%	2.7″	Lance	Plain	Plastic/Bakelite
4½″ SIZE						
Model 1941	D-C CORMAG	2%*	3.9″	Lance	Plain	Plastic/Bakelite
Model 1942	Rect. CORMAG	2%**	3.9″	Lance	Plain	Plastic/Bakelite
Model 1944	Iron Vane	2%	3.9″	Lance	Plain	Plastic/Bakelite
Model 1946	D-C Ext. Mag.	1%	3.9″	Knife-Edge	Mirrored	Plastic/Bakelite
Model 1948	Thermo. Ext. Mag.	2%	3.9″	Lance	Plain	Plastic/Bakelite
5½″ SIZE						
Model 1951	D-C CORMAG	2%*	4.7″	Lance	Plain	Plastic/Bakelite
Model 1952	Rect. CORMAG	2%**	4.7″	Lance	Plain	Plastic/Bakelite
Model 1954	Iron Vane	2%	4.7″	Lance	Plain	Plastic/Bakelite
Model 1956	D-C Ext. Mag.	1%	4.7″	Knife-Edge	Mirrored	Plastic/Bakelite
Model 1958	Thermo. Ext. Mag.	2%	4.7″	Lance	Plain	Plastic/Bakelite
7½″ SIZE						
Model 1971	D-C CORMAG	1%†	7.2″	Lance	Plain	Plastic Only
Model 1972	Rect. CORMAG	2%††	7.2″	Lance	Plain	Plastic Only
Model 1976	D-C Ext. Mag.	1%†	7.2″	Lance	Plain	Plastic Only

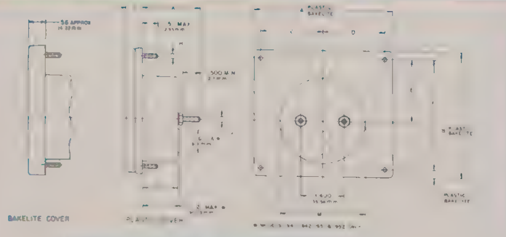
*1% when knife-edge pointer and mirrored scale is specified. **on sine wave 60 cycle source at normal room temperature of 25 C. †½% with knife-edge pointer and mirrored scale available on all listed ranges. All others, correspondence invited. ††on sine wave 60 cycle source at normal room temperature; 1½% can be supplied on special order. NOTE: If Models 1924, 34, 36, 38, 44, 46, 48, 54, 56, 58, 76 and 77 are used on steel panels, order should specify panel thickness to assure proper adjustment.

Model		PLASTIC COVER			BAKELITE COVER			D	E	F	G Thd Size	H Thd Size	J	K	L	M
		A	B	C	A	B	C									
1911 1912	ALL RANGES ALL RANGES						See below for dimensions.									
1921 1922 1924	30 AMPS AND UNDER ALL RANGES BELOW 5 AMPS	2.81 max 71.37 mm	2.39 max 60.70 mm	.210 5.33 mm	2.93 74.42 mm	2.51 63.75 mm	.32 8.13 mm	.940 23.87 mm	.940 23.87 mm	1.880 47.75 mm	#8-32	#4-40	.440 max 11.17 mm	2.00 max 50.8 mm	1.24 max 31.49 mm	2.21 max 56.13 mm
1924	5 AMPS AND ABOVE	2.81 max 71.37 mm	2.39 max 60.70 mm	.210 5.33 mm	2.93 74.42 mm	2.51 63.75 mm	.32 8.13 mm	.940 23.87 mm	.940 23.87 mm	1.880 47.75 mm	¼-28	#4-40	.440 max 11.17 mm	2.00 max 50.8 mm	1.24 max 31.49 mm	2.21 max 56.13 mm
1931 1932 1934 1936	30 AMPS AND UNDER ALL RANGES BELOW 10 AMPS ALL RANGES	3.51 max 89.15 mm	2.99 max 75.94 mm	.312 7.93 mm	3.66 max 92.96 mm	3.14 max 79.75 mm	.391 9.92 mm	1.125 28.57 mm	1.125 28.57 mm	2.250 57.15 mm	#8-32	#4-40	.56 max 14.22 mm	1.91 max 48.51 mm	1.15 max 29.21 mm	2.76 max 70.10 mm
1934 1938	10 AMPS AND ABOVE ALL RANGES	3.51 max 89.15 mm	2.99 max 75.94 mm	.312 7.93 mm	3.66 max 92.96 mm	3.14 max 79.75 mm	.391 9.92 mm	1.125 28.57 mm	1.125 28.57 mm	2.250 57.15 mm	¼-28	#4-40	.56 max 14.22 mm	1.91 max 48.51 mm	1.15 max 29.21 mm	2.76 max 70.10 mm
1941 1942 1944 1946	30 AMPS AND UNDER ALL RANGES BELOW 10 AMPS ALL RANGES	4.53 max 115.06 mm	4.07 max 103.37 mm	.250 6.35 mm	4.68 max 118.87 mm	4.22 max 107.18 mm	.320 8.12 mm	2.000 50.8 mm	2.020 51.30 mm	3.560 90.42 mm	#8-32	#6-32	.56 max 14.22 mm	1.91 max 48.51 mm	1.15 max 29.21 mm	2.76 max 70.10 mm
1941 1944 1948	ABOVE 30 AMPS 10 AMPS AND ABOVE ALL RANGES	4.53 max 115.06 mm	4.07 max 103.37 mm	.250 6.35 mm	4.68 max 118.87 mm	4.22 max 107.18 mm	.320 8.12 mm	2.000 50.8 mm	2.020 51.30 mm	3.560 90.42 mm	¼-28	#6-32	.56 max 14.22 mm	1.91 max 48.51 mm	1.15 max 29.21 mm	2.76 max 70.10 mm
1951 1952 1954 1956	30 AMPS AND UNDER ALL RANGES BELOW 10 AMPS ALL RANGES	5.62 max 142.74 mm	4.49 max 114.04 mm	.735 18.65 mm	5.77 max 146.55 mm	4.64 max 117.85 mm	.813 20.63 mm	2.625 66.67 mm	2.150 54.61 mm	3.000 76.2 mm	#8-32	#6-32	.56 max 14.22 mm	1.91 max 48.51 mm	1.15 max 29.21 mm	2.76 max 70.10 mm
1951 1954 1958	ABOVE 30 AMPS 10 AMPS AND ABOVE ALL RANGES	5.62 max 142.74 mm	4.49 max 114.04 mm	.735 18.65 mm	5.77 max 146.55 mm	4.64 max 117.85 mm	.813 20.63 mm	2.625 66.67 mm	2.150 54.61 mm	3.000 76.2 mm	¼-28	#6-32	.56 max 14.22 mm	1.91 max 48.51 mm	1.15 max 29.21 mm	2.76 max 70.10 mm

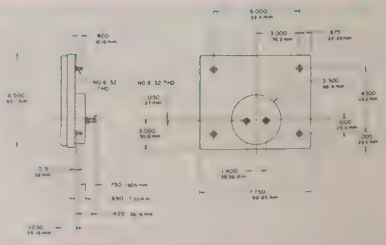


(All Dimensions are Approximate)

Models 1911-1912



Models 1921/1931/1941/1951 Groups

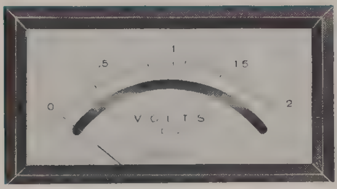


Models 1971/1972/1976

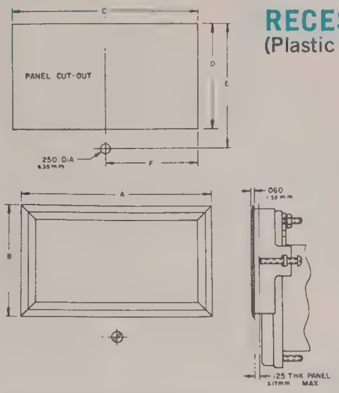
GENERAL. The 1900 Series is an integrated line of a-c and d-c panel instruments, providing a carefully selected choice of sizes, case styles, accuracies, pointers, scales and ranges. Particular attention has been paid to designing instruments that will present an overall appearance of harmony, even when random sizes are mounted side by side. Mounting bezels provide three types of mounting — recess, flush and conventional.

One of the outstanding features of this Weston series is that taut band instruments are physically interchangeable with the pivot and jewel 1900 Series. Careful attention to construction details permits quick interchangeability of fronts and easy access for adjustment or service, if ever required. All in all, Weston 1900 Series instruments incorporate the fine workmanship and dependability that is traditional with Weston.

THREE TYPES OF MOUNTING / 1900 SERIES


0
.5
1
1.5
2
VOLTS
D.C.

Only the scale is visible since meter is mounted behind the panel . . . half bezel fits into window.

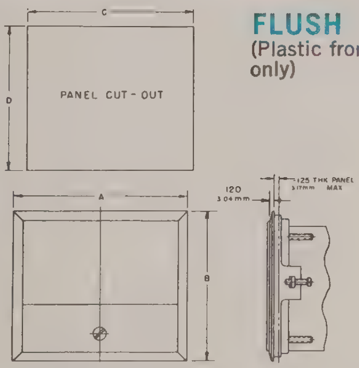

C
D
E
PANEL CUT-OUT
.250 DIA
6.35mm
F
A
B
.060
1.52mm
.125 THK PANEL
3.17mm MAX

RECESS
(Plastic front only)

MODEL	A	B	C	D	E	F
1921 1922 1924	3.120 IN 79.24 MM	1.720 43.62	3.000 76.2	$1\frac{19}{32}$ (1.593) 40.48	2.070 52.57	$1\frac{1}{2}$ (1.500) 38.1
1931 1932 1934 1936 1938	3.860 IN 98.04 MM	2.265 57.54	$3\frac{23}{32}$ (3.718) 94.45	$2\frac{5}{32}$ (2.156) 54.76	2.550 64.7	$1\frac{55}{64}$ (1.859) 47.22
1941 1942 1944 1946 1948	4.960 IN 125.98 MM	2.900 73.66	$4\frac{13}{16}$ (4.812) 122.23	$2\frac{3}{4}$ (2.750) 69.85	3.290 83.56	$2\frac{13}{32}$ (2.406) 61.11
1951 1952 1954 1956 1958	6.060 IN 153.92 MM	3.300 83.82	$5\frac{7}{8}$ (5.875) 149.22	$3\frac{5}{32}$ (3.156) 80.16	3.950 100.33	$2\frac{15}{16}$ (2.937) 74.61

2
4
6
8
MILLIAMPERES
D.C.
WESTON

Full Bezel permits mounting flush with panel through rectangular cutout.


C
D
PANEL CUT-OUT
A
B
.120
3.04mm
.125 THK PANEL
3.17mm MAX

FLUSH
(Plastic front only)

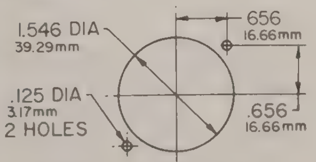
MODEL	A	B	C	D
1921 1922 1924	3.050 IN. 77.47 MM.	2.620 66.54	$2\frac{31}{32}$ 75.4	$2\frac{17}{32}$ 64.29
1931 1932 1934 1936 1938	3.830 IN. 97.28 MM.	3.320 84.32	$3\frac{11}{16}$ 93.66	$3\frac{3}{16}$ 80.96
1941 1942 1944 1946 1948	5.000 IN. 127.00 MM.	4.550 115.57	$4\frac{25}{32}$ 121.44	$4\frac{11}{32}$ 110.33

2
4
6
8
MILLIAMPERES
D.C.
WESTON

2
4
6
8
MILLIAMPERES
D.C.

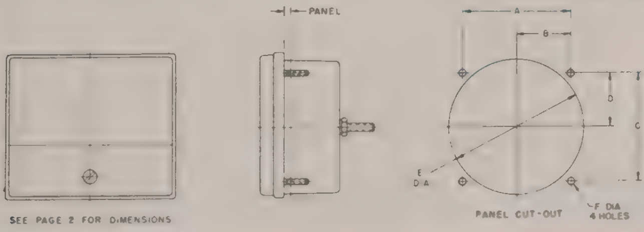
CONVENTIONAL

Use same dimensions, whether you choose a meter with taut band or pivot and jewel movement.


1.546 DIA
39.29mm
.656
16.66mm
.125 DIA
3.17mm
2 HOLES
.656
16.66mm

PANEL CUT-OUT-MODEL 1911

MODEL	A	B	C	D	E DIA	F DIA
1921 1922 1924	1.880 IN 47.75 MM	940 23.87	1 880 47.75	.940 23 87	2 220 50.8	125 3.17
1931 1932 1934 1936 1938	2.250 IN 57.15 MM	1 125 28.57	2 250 57.15	1 125 28.57	2.820 71.62	.125 3.17
1941 1942 1944 1946 1948	4.000 IN 101.6 MM	2 000 50.8	3 560 76.2	2 020 51.30	2 820 71 62	154 3.9
1951 1952 1954 1956 1958	5.250 IN. 133.35 MM	2.625 66.67	3.000 76.2	2.150 54.61	2.820 71.62	154 3.9
1971 1972	6.000 IN. 152.4 MM.	3.000 76.2	4 500 114.3	3.500 88.9	3 560 76 2	154 3 9


PANEL
A
B
D
C
E DIA
F DIA 4 HOLES
PANEL CUT-OUT

SEE PAGE 2 FOR DIMENSIONS

(All Dimensions are Approximate)

DC MICROAMMETERS

	1½″ MODEL 1911		2½″ MODEL 1921			3½″ MODEL 1931		
	Pivot & Jewel		Scale	Nominal Resistance		Scale	Nominal Resistance	
Range	Scale Div.	Resistance	Div.	Pivot & Jewel	Taut Band	Div.	Pivot & Jewel	Taut Band
*5								
*10								
*20								
30								
50	50	3800	50	4800	1950	50	4800	1950
100	50	1400	50	1225	538	50	1225	538
200	40	985	40	600		40	600	440
500	50	135	50	240		50	240	90
25-0-25	50	3800						
50-0-50	40	1400	40	1225	538	40	1225	
100-0-100			40	600		40	600	
500-0-500			50	88		50	88	

	3½″ MODEL 1936			4½″ MODEL 1941			4½″ MODEL 1946		
	Scale	Nominal Resistance		Scale	Nominal Resistance		Scale	Nominal Resistance	
Range	Div.	Pivot & Jewel	Taut Band	Div.	Pivot & Jewel	Taut Band	Div.	Pivot & Jewel	Taut Band
*5	50		13500				50		13500
*10	50		5300				50		5300
*20	40	5400	2100				40	5400	2100
30									
50	50	2180	870	50	2500	950	50	2180	870
100	50	870	320	50	2500	950	50	870	320
200	40	550	84	40	850	350	40	550	84
500	50	120	17	50	240	40	50	120	17
25-0-25				50	2500				
50-0-50				40	2500				
100-0-100				40	850				
500-0-500				50	115				

	5½″ MODEL 1951			5½″ MODEL 1956			7½″ MODEL 1971		
	Scale	Nominal Resistance		Scale	Nominal Resistance		Scale	Nominal Resistance	
Range	Div.	Pivot & Jewel	Taut Band	Div.	Pivot & Jewel	Taut Band	Div.	Pivot & Jewel	Taut Band
*5				50		13500			
*10				50		5300			
† *20				40	5400	2100	100		5750
† 30							150		3300
†50	50	2500	950	50	2180	870	100	5160	1850
100	50	2500	950	50	870	320	100	5160	1450
200	40	850	350	40	550	84	100	1680	350
500	50	240	40	50	120	17	100	935	230
25-0-25									
50-0-50									
100-0-100									
500-0-500									

	7½″ MODEL 1976		
	Scale	Nominal Resistance	
Range	Div.	Pivot & Jewel	Taut Band
*5			
*10			
*20			
30	150	5170	
50	100	2720	
100	100	2720	
200	100	756	
500			
25-0-25			
50-0-50			
100-0-100			
500-0-500			

*2% accuracy only

†Accuracy Model 1971—20 u, 30 ua and 50 ua range ±1% in horizontal position only; ±2% in vertical position

DC MILLIAMMETERS

	1½″ MODEL 1911		2½″ MODEL 1921			3½″ MODEL 1931		
	Pivot & Jewel		Scale	Nominal Resistance		Scale	Nominal Resistance	
Range	Scale Div.	Resistance	Div.	Pivot & Jewel	Taut Band	Div.	Pivot & Jewel	Taut Band
1	50	55.5	50	88	34.5	50	88	34.5
1.5								
2			40	45	14.3	40	45	14.3
3								
5	50	1.84	50	8.5		50	8.5	3.3
10	50	1.24	50	2.5	2.5	50	2.5	2.5
15			75	2.5				
20	40	.77	40	2.2	2.0	40	2.2	2.0
30								
50	50	2.0	50	2.0		50	2.0	1.0
100	50	1.0	50	1.0	0.5	50	1.0	0.5
200			40	0.5		40	0.5	2.5
300			60	0.33		60	0.33	
500			50	0.2		50	0.2	1.0

	4½″ MODEL 1941			5½″ MODEL 1951			7½″ MODEL 1971		
	Scale	Nominal Resistance		Scale	Nominal Resistance		Scale	Nominal Resistance	
Range	Div.	Pivot & Jewel	Taut Band	Div.	Pivot & Jewel	Taut Band	Div.	Pivot & Jewel	Taut Band
1	50	115.	12.5	50	115.	12.5	100	93.	93.
1.5							150	93.	51.
2	40	16.	4.9	40	16.	4.9	100	69.	46.
3	60	16.					150	33.5	16.
5	50	11.	3.0	50	11.	3.	100	12.6	16.
10	50	2.7	2.4	50	2.7	2.4	100	3.36	2.1
15	75	2.7							
20	40	2.7	2.4	40	2.7	2.4	100	1.0	.9
30							150	1.0	
50	50	2.0	2.0	50	2.0	2.0	100	1.0	1.0
100	50	1.0	1.0	50	1.0	1.0	100	0.5	0.5
200	40	0.5	0.5	40	0.5	0.5	100	0.25	0.25
300	60	0.33							
500	50	0.2	0.2	50	0.2	0.2	100	0.1	0.1

NOTE: Ranges of 30 ma and up are shunted and have a drop of approximately 100 mv on Models 1911, 1921, 1931, 1941 1951 and 1971 class 66.

DC AMMETERS

	1½″ MODEL 1911		2½″ MODEL 1921			3½″ MODEL 1931		
	Pivot & Jewel		Scale	Resistance		Scale	Resistance	
Range	Scale Div.	Resistance	Div.	Pivot & Jewel	Taut Band	Div.	Pivot & Jewel	Taut Band
1	50	↑	50	↑	↑	50	↑	↑
1.5								
2	40		40			40		
3								
5	50	Approx.	50	Approx.	Approx.	50	Approx.	Approx.
10	50	50 MV	50	50 MV	50 MV	50	50 MV	50 MV
20		Drop	40	Drop	Drop	40	Drop	Drop
25						50		
30		↓	60	↓	↓	60	↓	↓
50	50					50		

	4½″ MODEL 1941			5½″ MODEL 1951			7½″ MODEL 1971		
	Scale	Resistance		Scale	Resistance		Scale	Resistance	
Range	Div.	Pivot & Jewel	Taut Band	Div.	Pivot & Jewel	Taut Band	Div.	Pivot & Jewel	Taut Band
1	50	↑	↑	50	↑	↑	100	↑	↑
1.5							150		
2	40			40			100		
3							150		
5	50	Approx.	Approx.	50	Approx.	Approx.	100	Approx.	Approx.
10	50	50 MV	50 MV	50	50 MV	50 MV	100	50 MV	50 MV
20	40	Drop	Drop	40	Drop	Drop		Drop	Drop
25	50								
30	60	↓	↓	60	↓	↓		↓	↓
50	50			50			100		

NOTE: Ranges above 10 amps in Model 1911 and above 50 amps in Models 1921, 1931, 1941 1951 and 1971 class 66 use a 50 mv instrument with required external shunt.

DC VOLTMETERS

Range	1½″ MODEL 1911 Pivot & Jewel		2½″ MODEL 1921			3½″ MODEL 1931		
	Scale Div.	Ohms per Volt	Scale Div.	Ohms per Volt Pivot & Jewel	Ohms per Volt Taut Band	Scale Div.	Ohms per Volt Pivot & Jewel	Ohms per Volt Taut Band
1		2000 ↓		1000 ↓	1000 ↓		1000 ↓	1000 ↓
1.5								
2	40		40			40		
3								
5	50		50			50		
10	50		50			50		
15	30		75			75		
25			50			50		
30	60		60			60		
50	50		50			50		
80								
100	50		50			50		
150	30		75			75		
200			40			40		
300	30		60			60		
500			50			50		

Range	4½″ MODEL 1941			5½″ MODEL 1951			7½″ MODEL 1971		
	Scale Div.	Ohms per Volt Pivot & Jewel	Ohms per Volt Taut Band	Scale Div.	Ohms per Volt Pivot & Jewel	Ohms per Volt Taut Band	Scale Div.	Ohms per Volt Pivot & Jewel	Ohms per Volt Taut Band
1		1000 ↓	1000 ↓		1000 ↓	1000 ↓	100	1000 ↓	1000 ↓
1.5							150		
2	40			40			100		
3							150		
5	50			50			100		
10	50			50			100		
15	75			75			150		
25	50								
30	60			60			150		
50	50			50			100		
80							80		
100	50			50			100		
150	75			75			150		
200	40			40					
300	60			60			150		
500	50			50			100		

AC MICROAMMETERS (Rectifier Type)

Range	1½″ MODEL 1912 Pivot & Jewel		2½″ MODEL 1922			3½″ MODEL 1932		
	Scale Div.	Nominal Resistance	Scale Div.	Nominal Resistance Pivot & Jewel	Nominal Resistance Taut Band	Scale Div.	Nominal Resistance Pivot & Jewel	Nominal Resistance Taut Band
100			50	4000	3700	50	4000	3700
200			40	2000	2080	40	2000	2080
500			50	800	610	50	800	610

Range	4½″ MODEL 1942			5½″ MODEL 1952			7½″ MODEL 1972		
	Scale Div.	Nominal Resistance Pivot & Jewel	Nominal Resistance Taut Band	Scale Div.	Nominal Resistance Pivot & Jewel	Nominal Resistance Taut Band	Scale Div.	Nominal Resistance Pivot & Jewel	Nominal Resistance Taut Band
100	50	5000	3700	50	5000	3700			
200	40	2300	2080	40	2300	2300	100	3000	2550
500	50	800	610	50	800	800	100	1500	615

AC MILLIAMMETERS (Rectifier Type)

	1½″ MODEL 1912		2½″ MODEL 1922			3½″ MODEL 1932		
	Pivot & Jewel		Scale Div.	Nominal Resistance		Scale Div.	Nominal Resistance	
Range	Scale Div.	Nominal Resistance		Pivot & Jewel	Taut Band		Pivot & Jewel	Taut Band
1			50	475	390	50	475	390
2			40	280	255	40	280	255
5			50	140	130	50	140	130

	4½″ MODEL 1942			5½″ MODEL 1952			7½″ MODEL 1972		
	Scale Div.	Nominal Resistance		Scale Div.	Nominal Resistance		Scale Div.	Nominal Resistance	
Range		Pivot & Jewel	Taut Band		Pivot & Jewel	Taut Band		Pivot & Jewel	Taut Band
1	50	475	390	50	475	390	100	460	390
2	40	280	255	40	280	255			
5	50	140	130	50	140	130	100	150	145

AC VOLTMETERS (Rectifier Type)

	1½″ MODEL 1912		2½″ MODEL 1922			3½″ MODEL 1932		
	Pivot & Jewel		Scale Div.	Ohms per Volt		Scale Div.	Ohms per Volt	
Range	Scale Div.	Ohms per Volt		Pivot & Jewel	Taut Band		Pivot & Jewel	Taut Band
3			60	1000	1000		1000	1000
5			50	↓	↓	50	↓	↓
7.5			75	↓	↓		↓	↓
10				↓	↓	50	↓	↓
15			75	↓	↓	75	↓	↓
30			60	↓	↓	60	↓	↓
75			75	↓	↓	75	↓	↓
150	30	2000	75	↓	↓	75	↓	↓
300	30	2000	60	↓	↓		↓	↓
500				↓	↓		↓	↓

	4½″ MODEL 1942			5½″ MODEL 1952			7½″ MODEL 1972		
	Scale Div.	Ohms per Volt		Scale Div.	Ohms per Volt		Scale Div.	Ohms per Volt	
Range		Pivot & Jewel	Taut Band		Pivot & Jewel	Taut Band		Pivot & Jewel	Taut Band
3	60	1000	1000	60	1000	1000		1000	1000
5	50	↓	↓		↓	↓		↓	↓
7.5	75	↓	↓	75	↓	↓		↓	↓
10	50	↓	↓		↓	↓		↓	↓
15	75	↓	↓	75	↓	↓	150	↓	↓
30	60	↓	↓	60	↓	↓	150	↓	↓
75	75	↓	↓	75	↓	↓	150	↓	↓
150	75	↓	↓	75	↓	↓	150	↓	↓
300	60	↓	↓	60	↓	↓	150	↓	↓
500	50	↓	↓	50	↓	↓	100	↓	↓

AC MILLIAMETERS Iron Vane (Pivot and Jewel Only) Frequency: 25 to 500 cps.

	2½″ MODEL 1924		3½″ MODEL 1934		4½″ MODEL 1944		5½″ MODEL 1954	
Range	Scale Div.	Nominal Resistance	Scale Div.	Nominal Resistance	Scale Div.	Nominal Resistance	Scale Div.	Nominal Resistance
10	20	2550	50	2550	50	2550	50	2550
20	40	637	40	637	40	637	40	637
50	25	100	50	100	50	100	50	100
100	20	25	50	25	50	25	50	25
200	40	6.33	40	6.33	40	6.33	40	6.33
250	25	4.0	50	4.0	50	4.0	50	4.0
500	25	1.0	50	1.0	50	1.0	50	1.0

AC AMMETERS Iron Vane (Pivot and Jewel Only) Frequency: 25 to 500 cps.

	2½" MODEL 1924		3½" MODEL 1934		4½" MODEL 1944		5½" MODEL 1954	
Range	Scale Div.	Nominal Resistance	Scale Div.	Nominal Resistance	Scale Div.	Nominal Resistance	Scale Div.	Nominal Resistance
1	50	.25	50	.25	50	.25	50	.25
2	40	.062	40	.062	40	.062	40	.062
3	60	.025	60	.025	60	.025	60	.025
5	50	.016	50	.016	50	.016	50	.016
10	50	.0045	50	.0045	50	.0045	50	.0045
15	75	.0025	75	.0025	75	.0025	75	.0025
20	40	.0011	40	.0011	40	.0011	40	.0011
25	50		50	.0011	50	.0011	50	.0011
30	60	.00056	60	.00056	60	.00056	60	.00056
50	50	.00027	50	.00027	50	.00027	50	.00027

NOTE: Power Consumption: 5 ampere range, at 5 amperes, 0.45 watts; at 60 cps, 0.45 volt-amperes.

AC VOLTMETERS Iron Vane (Pivot & Jewel Only) Frequency: 25 to 125 cps*

	2½" MODEL 1924		3½" MODEL 1934		4½" MODEL 1944		5½" MODEL 1954	
Range	Scale Div.	Nominal Resistance	Scale Div.	Nominal Resistance	Scale Div.	Nominal Resistance	Scale Div.	Nominal Resistance
3	60	6	60	6	60	6	60	6
7.5	75	37.5	75	37.5	75	37.5	75	37.5
10	50	66.5	50	66.5	50	66.5	50	66.5
15	75	150	75	150	75	150	75	150
25	50	500	50	500	50	500	50	500
30	60	600	60	600	60	600	60	600
50	50	1665	50	1665	50	1665	50	1665
75	75	3750	75	3750	75	3750	75	3750
100	50	6700	50	6700	50	6700	50	6700
150	75	15,000	75	15,000	75	15,000	75	15,000
300	60	60,000	60	60,000	60	60,000	60	60,000
500	50	100,000	50	100,000	50	100,000	50	100,000

*Can be adjusted for 400 (±10%) cps.

NOTE: Power Consumption: 150 Volt Range at 115 Volts, 1.15 watts, at 60 cps, 1.15 volt-amperes.

THERMO-AMMETERS (Linear Scale Only)

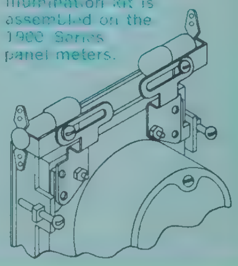
Range	3½" MODEL 1938 Pivot & Jewel or Taut Band Scale Div.	4½" MODEL 1948 Pivot & Jewel or Taut Band Scale Div.	5½" MODEL 1958 Pivot & Jewel or Taut Band Scale Div.
1	50	50	50
1.5	75	75	75
2	40	40	40
3	60	60	60
5	50	50	50
7.5	75	75	75
10	50	50	50
15	75	75	75

ILLUMINATION KITS. (For use with plastic front Model 1900 Series Meters only)

If scale illumination is required a kit can be furnished at an additional charge. Kit consists of: (1) Special half frame bezel, (2) Mounting brackets and light sockets. (Bulbs not included. Recommended bulb: NEMA #47 - 64 Frosted White Lamp). Weston Part No. ND 21865

Model	Part No.
1930 Series	245509
1940 Series	245510
1950 Series	245511

NOTE: Panel cutout same as shown for mounting recess bezels on page 3.



Drawing illustrates how illumination kit is assembled on the 1900 Series panel meters.

WESTON INSTRUMENTS DIVISION

WESTON INSTRUMENTS, INC.

614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114

a Schlumberger company

Circular 01-120-D
September 1969

PRINTED IN U.S.A.

WESTON

EDGEWISE THIN LINE PANEL METER
MODEL 121

Completely Flat -- Can Be Stacked Side-by-Side

Parallax Eliminated -- In-Line Pointer and Scale

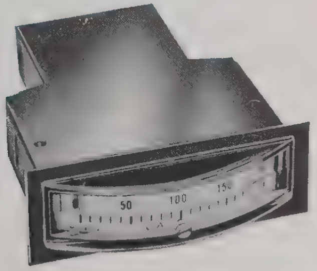
New Self-Shielded Mechanism

Saves Panel Space

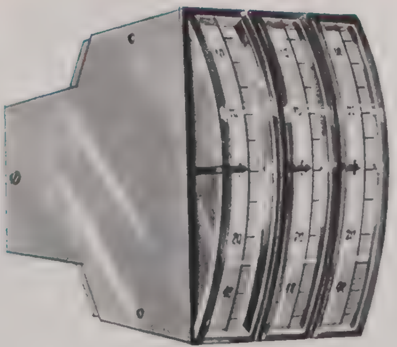
Illumination Available (Self-Contained)

Designed to Meet ASA C39.1 Performance Specifications

Front Mounted Zero Corrector



The Model 121 is basically a 2½ inch flat edgewise meter offering many benefits not generally offered in this type of meter. To eliminate parallax normally associated with edgewise meters an "in-line" scale is standard; a red pointer increases readability. For those requiring lighting, self-contained illumination is available as an optional feature. The bulbs are removable while the meters are mounted in the panel — even when "stacked" side-by-side. ■ The Model 121 utilizes a completely new mechanism design. This is the only edgewise instrument incorporating a true flat CORMAG® mechanism design for shielding purposes. The magnet is inside the moving coil as in all Weston cormag designs and the resulting inherent shielding allows mounting on magnetic or non-magnetic panels without need for adjustment, as well as the ability to "stack" meters side-by-side without any interaction. The mechanism also has a shock absorption jewel arrangement to assure long life.



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Accuracy: 2% of full scale value for DC
3% of full scale value for AC Rectifier Type

Scale Length: 1.875 inches; Anti-parallax in-line scale

Pointer: Red Lance Type

Movement: New self shielded thin line cormag mechanism. Shock mounted jewel arrangement.

Ranges:	Voltage:	Current:
	50 mv minimum	50 ua minimum
	500 volts maximum	20 amps maximum
	self-contained	self-contained

Mounting: Meter can be mounted either horizontally or vertically. Order proper meter from price list for the required type mounting.

Mounting clips fasten to meter behind panel — no screws show on front of panel. (Bezel furnished for single meter mounting.) For "stacking" thru holes are provided so stack can be bolted together.

Illumination: Two G.E. 328 lamps are used. Recommended operating voltage — 5 volts (less than 200 ma per bulb). Expected life greater than 5,000 hours.

Dielectric: 1500 volts RMS

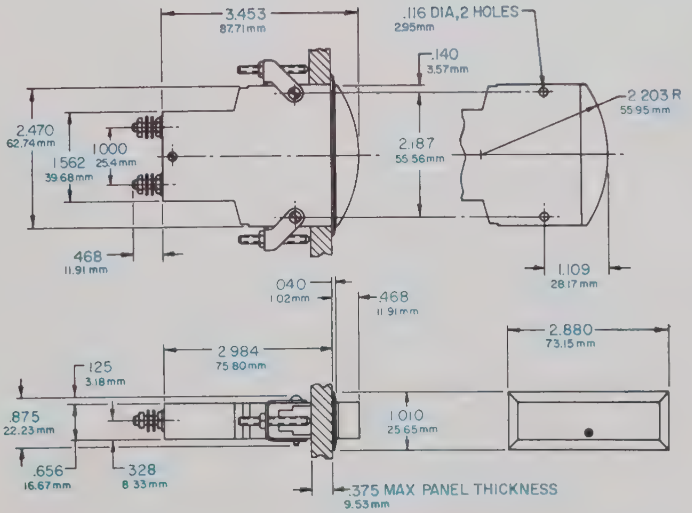
DC VOLTMETERS	**RESISTANCE**
0-10	5000 Ω/v
0-25	5000 Ω/v
0-50	5000 Ω/v
0-100	5000 Ω/v
0-150	5000 Ω/v
0-300	5000 Ω/v

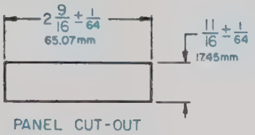
DC MILLIAMMETERS	**RESISTANCE**
0-1	39 Ohms
0-5	5.2 Ohms
0-10	.2 Ohms
0-25	.2 Ohms
0-100	.5 Ohms
0-150	.33 Ohms
0-250	.20 Ohms
0-500	.10 Ohms

DC MICROAMMETERS	**RESISTANCE**
0-50	2300 Ohms
0-100	900 Ohms
0-200	600 Ohms
0-500	134 Ohms
50-0-50	900 Ohms

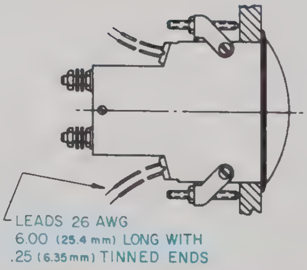
DC AMMETERS	**RESISTANCE**
0-1	.05 Ohms

AC VOLTMETERS (Rectifier Type)	**RESISTANCE**
0-150	2000 Ω/v
0-300	2000 Ω/v


3.453
87.71mm
.116 DIA, 2 HOLES
2.95mm
.140
3.57mm
2.203 R
55.95mm
2.470
62.74mm
1.000
25.4mm
1.562
39.68mm
2.187
55.56mm
.468
11.91 mm
1.109
28.17mm
.040
1.02mm
.468
11.91mm
2.880
73.15mm
2.984
75.80mm
.125
3.18mm
.875
22.23mm
1.010
25.65mm
.656
16.67mm
.328
8.33mm
.375 MAX PANEL THICKNESS
9.53mm


2 9/16 ± 1/64
65.07mm
11/16 ± 1/64
17.45mm

PANEL CUT-OUT


LEADS 26 AWG
6.00 (25.4 mm) LONG WITH
.25 (6.35mm) TINNED ENDS

View showing illumination feature

All Dimensions Are Approximate.

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614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
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01 - 121 - D 11/69 WK

WESTON®

RIBBON INDICATOR
MODEL 1316

PRICE LIST
01-124
Effective
JUNE 1969

All Prices Subject to Change Without Notice and are F.O.B. Factory, Newark, N. J.

MODEL 1316 D.C. MILLIAMPERES

Range	Catalog No. (Vertical Mounting)	Price
4-20 (Suppressed Zero)	4912920	$77.50
10-50 (Suppressed Zero)	4912950	77.50
0-1	4912001	77.50
0-5	4912005	77.50
0-10	4912010	77.50
0-20	4912020	77.50
0-25	4912025	77.50
0-50	4912050	77.50
0-100	4912100	77.50
0-250	4912250	77.50
0-500	4912500	77.50

MODEL 1316 D.C. MICROAMPERES

Range	Catalog No. (Vertical Mounting)	Price
0-20	5912020	$85.00
0-25	5912025	79.00
0-50	5912050	79.00
0-100	5912100	78.00
0-200	5912200	78.00
0-250	5912250	78.00
0-500	5912500	78.00

MODEL 1316 D.C. VOLTS

0-1	1912001	$78.50
0-5	1912005	78.50
0-10	1912010	78.50
0-20	1912020	78.50
0-50	1912050	78.50
0-100	1912100	78.50
0-150	1912150	78.50
0-200	1912200	78.50
0-300	1912300	78.50
0-500	1912500	78.50

DC ranges up to 50 amperes can be self-contained for higher ranges . A 50 MV meter with proper ampere scale will be provided for use with Standard external 50 MV shunts.

For single ranges 1,2,5,10,20,30 or 50 amps (self-contained). . . . $79.00

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614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
a Schlumberger company

Printed in U.S.A.

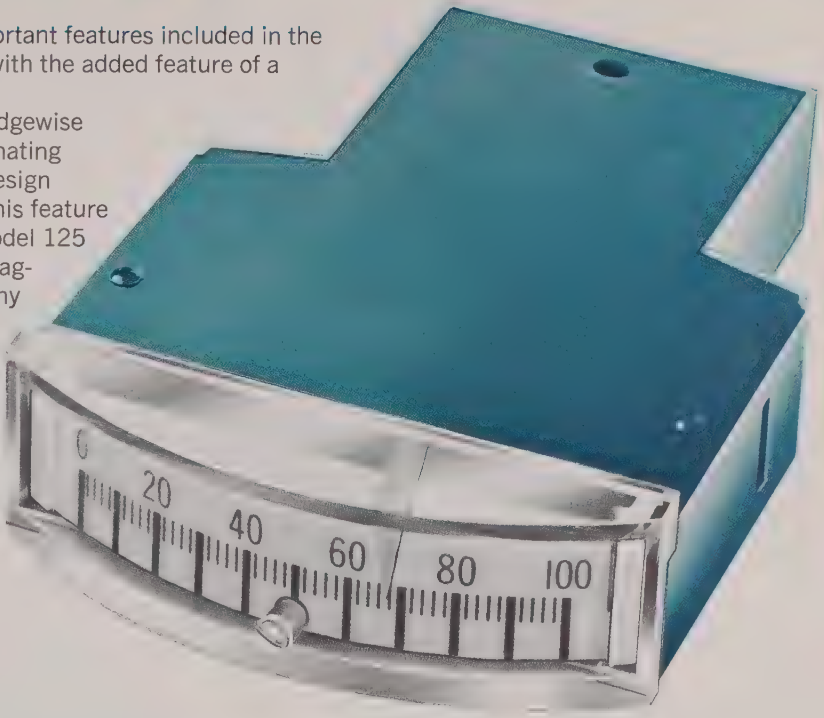
WESTON®

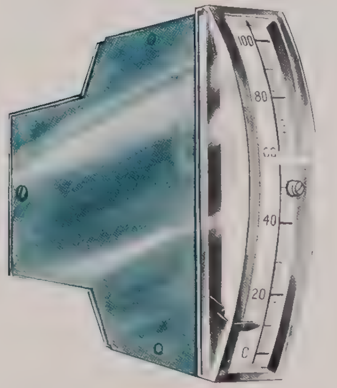
EDGEWISE THIN LINE PANEL METER
MODEL 125

The Model 125 incorporates all the important features included in the Weston line of edgewise panel meters, with the added feature of a new wide face to improve readability.

Basically, the Model 125 is a 2½ inch edgewise meter, designed with a flat barrel, eliminating the "Bubble". Included in the meter's design is the Weston CORMAG® mechanism. This feature provides inherent shielding, allowing Model 125 meters to be mounted side-by-side on magnetic or non magnetic panels, without any interaction. Self-contained illumination is available as an optional feature.

The Model 125 is available with either a vertical or horizontal scale. It is equipped with a front-mounted zero corrector and a shock absorption jewel mount to assure long life.





FEATURES

- New wide face—improved readability
- New self-shielded mechanism
- Illumination available (self contained)
- Front-mounted zero corrector
- Designed to meet ASA C39.1 performance specifications

SPECIFICATIONS

Accuracy:	2% of full scale value for DC 3% of full scale value for AC Rectifier Type	
Scale Length:	1.875 inches	
Pointer:	Red Lance Type	
Movement:	New self shielded thin line cormag mechanism. Shock mounted jewel arrangement.	
Ranges:	Voltage: 50 mv minimum 500 volts maximum self-contained	Current: 50 ua minimum 20 amps maximum self-contained

Mounting: Meter can be mounted either horizontally or vertically. Order proper meter from price list for the required type mounting.

Mounting clips fasten to meter behind panel—no screws show on front of panel. (Bezel furnished for single meter mounting.)

Illumination: Optional, two G.E. 328 lamps are used. Recommended operating voltage—5 volts (less than 200 ma per bulb). Expected life greater than 5,000 hours.

Dielectric: 1500 volts RMS

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DC VOLTMETERS — MODEL 125

RANGE	SCALE DIV.	*RESISTANCE	CATALOG NUMBERS	
			HORIZONTAL	VERTICAL
0-10	50	5000 Ω/V	125-1921010	—
0-25	50	5000 Ω/V	125-1921025	—
0-50	50	5000 Ω/V	125-1921050	—
0-100	50	5000 Ω/V	125-1921100	—
0-150	50	5000 Ω/V	125-1921150	—
0-300	50	5000 Ω/V	125-1921300	—

DC MILLIAMMETERS — MODEL 125

RANGE	SCALE DIV.	*RESISTANCE	CATALOG NUMBERS	
			HORIZONTAL	VERTICAL
0-1	50	38 OHMS	125-4921001	125-4922001
0-5	50	5.2 OHMS	125-4921005	—
0-10	50	2.3 OHMS	125-4921010	—
0-25	50	2.3 OHMS	125-4921025	—
0-50	50	2.3 OHMS	125-4921050	—
0-150	30	0.33 OHMS	125-4921150	—
0-250	50	0.20 OHMS	125-4921250	—
0-500	50	0.10 OHMS	125-4921500	—

*****All resistances are approximate.*

DC AMMETERS — MODEL 125

RANGE	SCALE DIV.	*RESISTANCE	CATALOG NUMBERS	
			HORIZONTAL	VERTICAL
0-1	50	0.05 OHMS	125-2921001	—

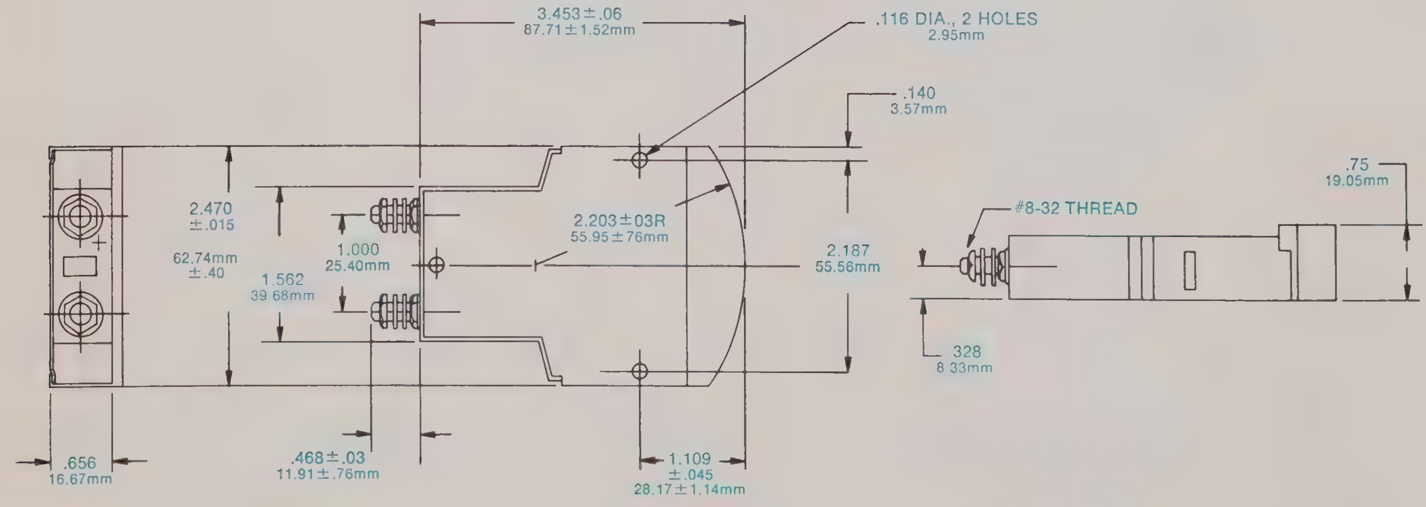
Ranges up to 2 amperes can be self-contained; for higher ranges, a 50 MV meter with proper ampere scale will be provided for use with standard external 50 MV Shunts

DC MICROAMMETERS — MODEL 125

RANGE	SCALE DIV.	*RESISTANCE	CATALOG NUMBERS	
			HORIZONTAL	VERTICAL
0-50	50	2300 OHMS	125-5921050	125-5922050
0-100	50	900 OHMS	125-5921100	125-5922100
0-200	40	600 OHMS	125-5921200	—
0-500	50	134 OHMS	125-5921500	—
50-0-50	50	900 OHMS	125-5921750	125-5922750

AC VOLTMETERS — MODEL 127 (RECTIFIER TYPE) (3% ACCURACY)

RANGE	SCALE DIV.	*RESISTANCE	CATALOG NUMBERS	
			HORIZONTAL	VERTICAL
0-150	30	2000 Ω/V	127-1931150	—
0-300	30	2000 Ω/V	127-1931300	—


3.453±.06
87.71±1.52mm
.116 DIA., 2 HOLES
2.95mm
.140
3.57mm
.75
19.05mm
#8-32 THREAD
2.470
±.015
62.74mm
±.40
1.000
25.40mm
1.562
39 68mm
2.203±03R
55.95±76mm
2.187
55.56mm
328
8 33mm
.656
16.67mm
.468±.03
11.91±.76mm
1.109
±.045
28.17±1.14mm

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a Schlumberger company

CIRCULAR 01-125 MJK
AUGUST, 1969 NEW RELEASE

WESTON®
prime
source for precision
...since 1888

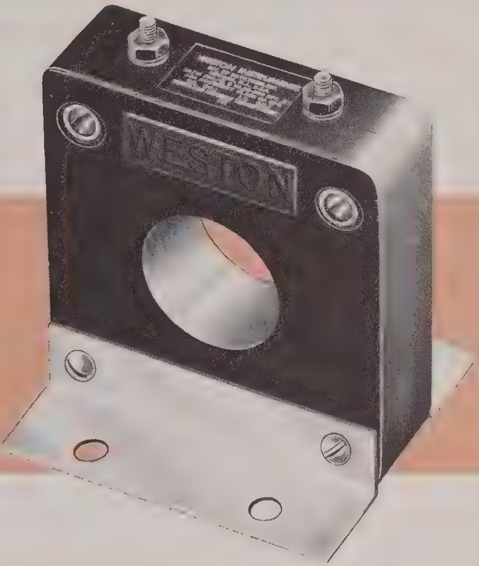
INSTRUMENT TRANSFORMERS Models 605 & 607

PANEL / SWBD

CIRCULAR 01-405-E
APRIL, 1968
Supersedes 01-405-D

FEATURES

- Meet ASA Accuracy Standards
- Have Improved Characteristics
- Easy to Mount
- More Ranges
- Economically Priced
- Variable Ratio Capabilities



DETAILED SPECIFICATIONS

GENERAL— these transformers are the inserted primary, toroidal type. They are for use with both 1% and 2% panel and switchboard ammeters OR wattmeters.

ACCURACY— Meet ASA C57.13 standard accuracy classes as shown in tables below. The Model 605, 100 ampere range meets the requirements of ASA accuracy class 1.2 for ratio correction factor; phase angle errors will be less than 1° at 100% rated current and less than 2.5° at 10% rated current.

INSULATION BREAKDOWN — 2600 volts a-c, 60 cps for 5 seconds between a bare conductor through the core opening and the secondary terminals. When additional secondary turns are used for variable ratio applications, the insulation breakdown will depend upon the rating of the insulation used for the primary and additional secondary wire.

IMPROVED CHARACTERISTICS— tape wound silicon steel core, covered with tough nylon jacket . . . secondary winding of insulated (FORMEX) wire — these exceptional materials not only improve characteristics, but also provide trouble-free performance under normal environmental conditions.

EXTERNAL CONNECTING WIRE — the secondary leads form part of the burden on the transformer and if their resistance is too great, the transformer accuracy can be affected. The equivalent of #14 wire is recommended for short lengths of leads.

FREQUENCY — accuracies are given for 60 cps in accordance with ASA classifications. These transformers may be used from 25 to 800 cps with little change in accuracy.

MULTIPLE MOUNTING— two cadmium plated steel brackets and bolts supplied . . . 4 holes in case permit mounting in a variety of positions . . . can be mounted without brackets on any suitable surface (since surfaces are smooth, transformer case will have full contact on any flat surface).

RUGGED CASES—molded from impact and abrasive resistant plastic . . . rectangular in shape and always uniform in size (dimensional drawings on page 4).

CONVENIENT TERMINALS—#8-32 brass studs; supplied with nut and washer for quick, easy connection.

NAMEPLATE — permanently mounted and provides complete transformer data which will not rub off.

RANGES— Model 605 Current Transformer

	ASA ACCURACY CLASS 60 cps		
Amps	. . . 1.5 va	B 0.1 2.5 va	B 0.2 5 va
100	*	. . .	. . .
150	.	1.2%	1.2%
200	. .	0.6%	1.2%
300		0.6%	0.6%
400	. . .	0.6%	0.6%

RANGES— Model 607 Current Transformer

	ASA ACCURACY CLASS 60 cps	
Amps	B 0.1 2.5 va	B 0.2 5 va
500	0.6%	0.6%
600	0.6%	0.6%
800	0.6%	0.6%
1000	0.3%	0.3%
1200	0.3%	0.3%
1500	0.3%	0.3%

---

*See "Accuracy" statement above.

Use of Models 605 and 607 as VARIABLE RATIO CURRENT TRANSFORMERS

A current transformer with variable ratio capabilities can make possible significant savings by eliminating the need for purchasing, and perhaps stocking, special instruments and transformers having many different ranges. This is accomplished by adjusting the transformer ratio so that 5 ampere range instruments can always be used to meet unusual and varied job requirements. For example, if a wattmeter, ammeter, or other indicating device is used in the secondary, a special scale may be required to suit the application, but a current range of 5 amperes can always be used. A basic 5 ampere current range instrument is the most popular, most easily obtained, and therefore lowest cost. Similarly, the basic Model 605 or 607 transformer also can have a popular, easily obtained, and low cost range.

The ratio of a current transformer depends upon the number of primary and secondary turns. The Models 605 and 607 Transformers are supplied with a single secondary winding having a definite number of turns and the primary is obtained by passing one of the conductors carrying current to the load through the hole in the transformer one or more times. By changing the number of primary and secondary turns, the transformer ratio can be changed. Secondary turns can be added or subtracted by winding turns through the core opening using the secondary leads.

DETERMINATION OF PRIMARY AND SECONDARY TURNS

To determine the proper winding for a particular application, it is necessary to determine the primary current for which a secondary current of 5 amperes is desired. For example, in a motor-load-percent indicator, the winding can be determined by first finding the full load current rating of the motor which can be taken from the nameplate on the motor, the manufacturer, or a table of full load current ratings of various motors. This full load current is then multiplied by the highest load percent on the indicator scale (125 or 150%) and divided by 100 to obtain the primary current for a secondary current of 5 amperes.

The proper primary and secondary turns for the current transformer used and for the primary current can now be calculated from the equation:

$$n = \frac{N_p I_p - R_p}{5}$$

where n = secondary turns to be added or subtracted
(If n is positive (+), turns must be added;
if n is negative (—), turns must be subtracted.)
N_p = primary turns to be inserted
I_p = Primary current for which a secondary current of 5 amperes is desired
R_p = nominal primary range of the transformer

See Page 4 for Dimensions of Models 605/607

Table Showing Primary and Secondary Turns Used to Obtain Various Ratios of Model 605 Having a Nominal Rating of 200/5 Amperes

Primary Range Amperes	Primary Turns	Secondary Turns	Primary Range Amperes	Primary Turns	Secondary Turns	Primary Range Amperes	Primary Turns	Secondary Turns	Primary Range Amperes	Primary Turns	Secondary Turns
275	1	+15	137.5	2	+15	71.7	3	+ 3	35.8	6	+ 3
270	1	+14	135	2	+14	70	3	+ 2	35	6	+ 2
265	1	+13	132.5	2	+13	68.3	3	+ 1	34.2	6	+ 1
260	1	+12	130	2	+12	66.7	3	0	33.3	6	0
255	1	+11	127.5	2	+11	65	3	— 1	32.5	6	— 1
250	1	+10	125	2	+10	63.3	3	— 2	31.7	6	— 2
245	1	+ 9	122.5	2	+ 9	61.7	3	— 3	30.8	6	— 3
240	1	+ 8	120	2	+ 8	60	3	— 4	30	7	+ 2
235	1	+ 7	117.5	2	+ 7	58.3	3	— 5	29.3	7	+ 1
230	1	+ 6	115	2	+ 6	57.5	4	+ 6	28.6	7	0
225	1	+ 5	112.5	2	+ 5	56.3	4	+ 5	27.9	7	— 1
220	1	+ 4	110	2	+ 4	55	4	+ 4	27.1	7	— 2
215	1	+ 3	107.5	2	+ 3	53.8	4	+ 3	26.9	8	+ 3
210	1	+ 2	105	2	+ 2	52.5	4	+ 2	26.3	8	+ 2
205	1	+ 1	102.5	2	+ 1	51.3	4	+ 1	25.6	8	+ 1
200	1	0	100	2	0	50	4	0	25	8	0
195	1	— 1	97.5	2	— 1	48.8	4	— 1	24.4	8	— 1
190	1	— 2	95	2	— 2	47.5	4	— 2	23.8	8	— 2
185	1	— 3	92.5	2	— 3	46.3	4	— 3	23.3	9	+ 2
180	1	— 4	90	2	— 4	45	4	— 4	22.8	9	+ 1
175	1	— 5	87.5	2	— 5	44	5	+ 4	22.2	9	0
170	1	— 6	85	2	— 6	43	5	+ 3	21.7	9	— 1
165	1	— 7	82.5	2	— 7	42	5	+ 2	21.1	9	— 2
160	1	— 8	80	2	— 8	41	5	+ 1	20.5	10	+ 1
155	1	— 9	78.3	3	+ 7	40	5	0	20	10	0
150	1	—10	76.7	3	+ 6	39	5	— 1	19.5	10	- 1
145	1	—11	75	3	+ 5	38	5	— 2			
140	1	—12	73.3	3	+ 4	37	5	— 3			

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NOTE: For best accuracy, product of $N_p\ I_p$ below 200 for Model 605, and 500 for Model 607 should be avoided.

If "n" is large, one primary turn more or less ($N_p \pm 1$) may give better results.

Example: Assume a 25 hp, 230 volt, 60 cycle, 3 phase motor is to be used with a current transformer rated at 200/5 amperes and a 5 ampere ammeter with a scale of 0-150 percent motor load. From the nameplate the full load current rating for the operation involved is found to be 68 amperes. The primary current is then $68 \times \frac{150}{100} = 102$ amperes.

Assume a value for N_p. In this case if N_p is assumed to be 1, $N_p\ I_p = 102$, which is below 200. Assume $N_p = 2$

$$n = \frac{2\ (102) - 200}{5} = \frac{204 - 200}{5} = +\frac{4}{5} \text{ or approx. } +1$$

Therefore, one turn must be added to the secondary and two turns wound on for the primary. This agrees with the tabulation at the bottom of page 2, for the nearest primary range, 102.5 amperes.

CONNECTION OF INSTRUMENT AND TRANSFORMER

After the primary and secondary turns have been determined, the instrument and transformer are connected as follows:

1. One conductor going to the motor is passed through the opening in the transformer the number of times specified for the primary turns required. Figure 1 shows two primary turns and Figure 2 shows one primary turn.
2. Wind the secondary leads (secondary leads are not provided with the transformer) through the core opening to add or subtract turns as required, and connect the secondary leads to the instrument and transformer terminals. To add turns (+), pass the secondary lead through the core opening from the "X1" terminal going in on the side opposite the "HI" side; from the other secondary terminal, pass the secondary lead through the core opening from the "HI" side.

   To subtract turns (—), pass the secondary lead through the core opening starting from the "XI" terminal and going in on the "HI" side; from the other secondary terminal pass the secondary lead through the core opening from the side opposite "HI".

   Figure 1 shows five turns added, two turns with one lead and three turns with the other. Figure 2 shows four turns subtracted, two with each lead.

NOTE:

1. Conductors going **through** the core opening **only** count as turns added or subtracted; any conductors passing around the outside of the transformer **do not count.**
2. Turns can be added or subtracted using either secondary lead, or both as indicated in the figures.

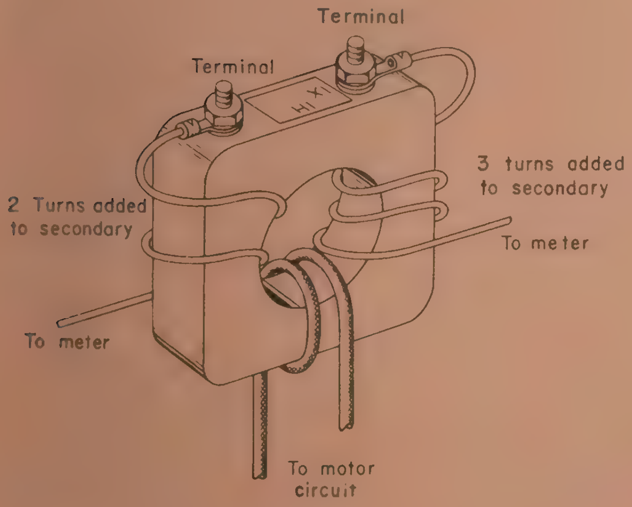


Figure 1: 5 turns added to secondary, 2 primary turns.

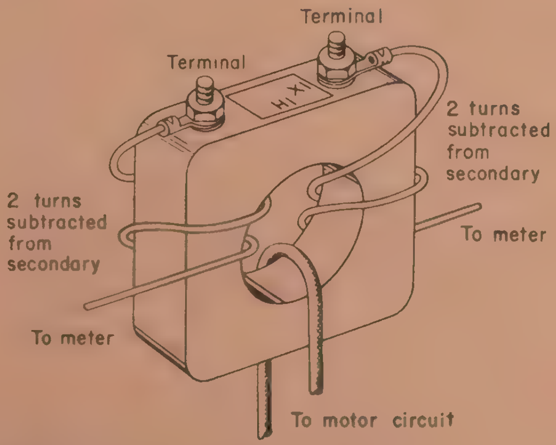
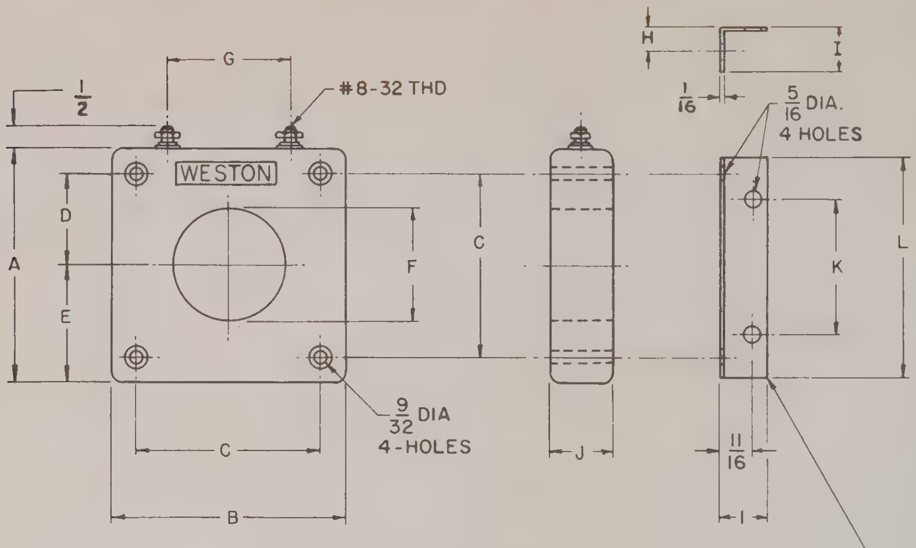

Terminal
Terminal
HI X1
2 turns subtracted from secondary
2 turns subtracted from secondary
To meter
To meter
To motor circuit

Figure 2: 4 turns subtracted from secondary, 1 primary turn.

DIMENSIONAL DIAGRAM OF MODELS 605/607

(all dimensions are approximate)

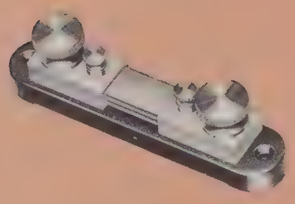


SUPPLIED WITH TWO BRACKETS AND HARDWARE FOR MTG. BRACKETS TO SIDES OR BOTTOM OF TRANSFORMER.

DIMENSION	A	B	C	D	E	F	G	H	I	J	K	L
MODEL 605	3-3/4	3-5/8	2-3/4	1-3/8	1-13/16	1-15/32	1-7/8	7/16	3/4	1-1/16	1-7/8	3-1/2
MODEL 607	4-11/16	4-11/16	3-3/4	1-7/8	2-11/32	2-5/16	2-1/2	15/32	7/8	1-5/16	2-3/4	4-1/2

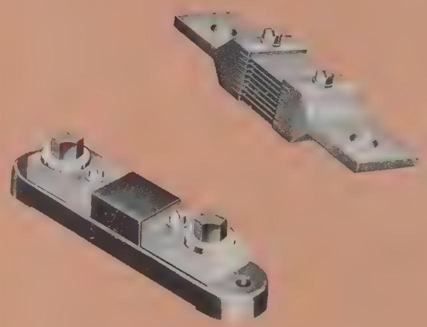
Approx. Wt.: Model 605, 1 lb. 4 oz.; Model 607, 2 lbs.

DEPENDABLE WESTON SHUNTS FOR MOST APPLICATIONS



PORTABLE TESTING SHUNTS

For general commercial testing in the field with any standard portable d-c ammeter.



HIGH AND LOW RANGE SWITCHBOARD SHUNTS

Liberal allowance for overload capacity and adequate contact surface. Ranges to 20,000 amperes.

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PRINTED IN U.S.

WESTON®

INSTRUMENT TRANSFORMERS
Models 605 and 607

PRICE LIST
01-405

Effective
DEC. 3, 1967

SUPERSEDES ISSUE
DATED 10/31/66

Model 605 – Current Transformer

Ratio	Catalog Number	Price
100:5	605-174975	$15.25
150:5	605-174976	↓
200:5	605-174977	
300:5	605-174978	
400:5	605-174979	

Model 607 – Current Transformer

Ratio	Catalog Number	Price
500:5	607-174980	$17.50
600:5	607-174981	↓
800:5	607-174982	
1000:5	607-174983	20.75
1200:5	607-174984	21.25
1500:5	607-174985	22.00

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INSTRUMENT SHUNTS

PRICE LIST
01-407

Effective
JAN. 1, 1970
SUPERSEDES ISSUE
DATED 12/3/67

All Prices Subject to Change Without Notice and are F. O. B. Factory, Newark, N. J.

Switchboard Type (50MV) – Model 9992

Cap. Amps.	Part Number	List Price	Cap. Amps.	Part Number	List Price	Cap. Amps.	Part Number	List Price
1	42258	$11.25	100	41207	$11.25	2000	124314	$ 66.50
1.5	42259		150	41210		2500	124315	84.75
2	42260		200	41211	↓	3000	124316	101.50
3	45790		250	24683	11.50	4000	124317	172.00
5	42211		300	23976	12.00	5000	124318	203.00
7.5	42170		400	23977	15.25	6000	124319	237.00
10	41196		500	23901	18.25	8000	124320	370.00
15	41197		600	23902	21.75	10000	124321	404.00
20	42166		800	23904	27.00	12000	124322	460.00
25	41198		1000	124311	40.00	15000	124323	598.00
30	41199		1200	124312	46.75	20000	124324	795.00
50	41202		1500	124313	58.75			
75	41205	↓						

Switchboard Type (100MV) – Model 9992

Cap. Amps.	Part Number	List Price	Cap. Amps.	Part Number	List Price	Cap. Amps.	Part Number	List Price
2	42258	$11.25	25	41230	$11.25	200	57790	$ 14.25
4	42260		30	41197		300	54339	16.00
6	45790		40	42166		400	81742	24.75
10	42211		50	41198		500	55202	29.50
15	42170		60	41199	↓	600	132780	70.75
20	41196	↓	100	41239	14.25	1000	132783	132.00
						2000	132786	286.00

Light Weight Type (50 MV) – Model 9992

Range Amps.	Type No.	Catalog No.	List Price	Range Amps.	Type No.	Catalog No.	List Price
1.	†	9992-0179724	$12.50	100	MSA-101	9992-0148258	$12.50
1.5	†	9992-0179726		120	†	9992-0246063	
3	†	9992-0179725		150	MSA-151	9992-0148259	
5	†	9992-0179719		170	MSB-171	9992-0148260	
10	MSA-100	9992-0179723		200	MSB-201	9992-0148261	
15	MSA-150	9992-0176993		250	MSB-251	9992-0148262	
20	MSA-200	9992-0179720		300	MSB-301	9992-0148263	↓
25	†	9992-0180304		400	MSB-401	9992-0148264	15.25
30	MSA-300	9992-0148253		450	MSB-451	9992-0148265	16.75
50	MSA-500	9992-0148254		500	MSB-501	9992-0148266	18.25
60	†	9992-0196064		600	MSB-601	9992-0148267	21.75
75	MSA-750	9992-0148255		800	MSC-801	9992-0148268	27.00
80	MSA-800	9992-0148256		1000	MSC-102	9992-0148269	40.00
85	MSA-850	9992-0148257	↓	1200	MSC-122	9992-0148270	46.75

† These ranges are not covered in MIL-S-61B as far as type numbers are concerned, but they will meet the specifications to the extent practicable.

NOTE. – Refer to the weekly stock inventory list to determine stock availability of shunts.

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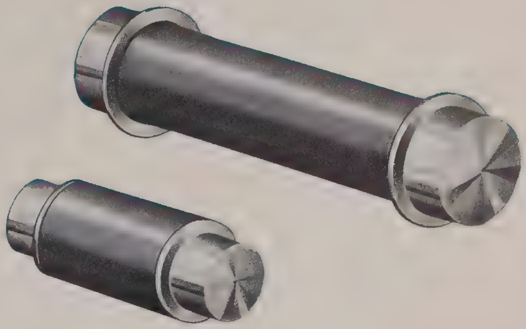
WESTON®

Tubular Resistors
Model 9858

The Weston Tubular High Voltage Resistor Model 9858 uses film type resistors. In tubular resistor form, the assembly surpasses or equals the performance of wire wound resistors in all respects. It meets and exceeds all of the requirements of MIL-R-29A.



CONSTRUCTION

In the Model 9858, selected film type resistors are mounted in series on a strip of glass epoxy. The strip is then epoxy-sealed in a practically unbreakable insulating tube impervious even to boiling salt water. This rugged design and sealed construction assures maximum stability of resistance and dependable performance under severe temperature, humidity, vibration and shock conditions.

MOUNTING

The resistor is intended to be mounted in a horizontal position in fuse clips on standoff insulators; however, it can be mounted in any position. The insulated portion of the tube should not be used for support, nor should it approach any metal closer than would be good practice for a live conductor carrying the same potential. Fuse clips are recommended having a spring clamping action for rugged mechanical installation and positive contact.

ACCURACY

These resistors are normally guaranteed to be accurate within ½ of 1% when operated under ordinary conditions. They may be operated in ambient temperatures as high as 80°C, subject to slightly increased errors as allowed by the reference specifications. When operating at ¾ rating the temperature rise may be figured as approximately 15°C. Inherent instrument accuracies are, of course, to arrive at the overall accuracy of the high voltage readings. They can be used on a-c at power frequencies.

APPLICATION

Available for all classes of service where measurements are to be made of high voltages, usually in the kilovolt ranges. They are used as series resistors with d-c and rectifier type a-c voltmeters having a sensitivity of 1000 ohms per volt or higher. Generally suited for any application requiring an accurately adjusted, highly stable high value resistor.

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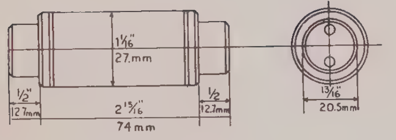
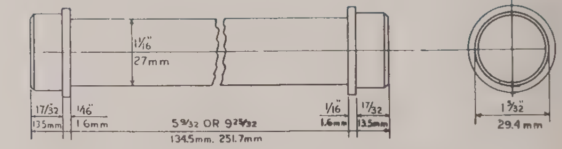
MODEL 9858 SPECIFICATIONS

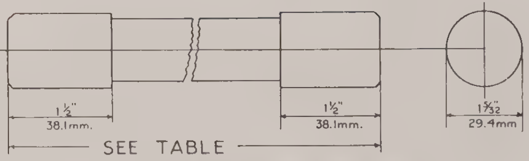
Weston Type No.	KV Rating	Resistance Megohms	Overall Length ±1/32"	MIL-R-29A Type	Catalog Number	List Prices
0.5	0.5	0.5	2-15/16"	MFC504	9858-9900001	$ 8.50 s
0.8	0.8	0.8	2-15/16"	MFC804	9858-9900002	10.75 s
1.0	1.0	1.0	2-15/16"	MFC105	9858-9900003	10.75 s
1.0	1.0	1.0	5-9/32"	MFB105	9858-9900015	12.50
1.5	1.5	1.5	5-9/32"	MFB155	9858-9900004	13.75 s
2.0	2.0	2.0	5-9/32"	MFB205	9858-9900005	15.50 s
2.5	2.5	2.5	5-9/32"	MFB255	9858-9900006	17.25 s
3.0	3.0	3.0	5-9/32"	MFB305	9858-9900007	19.25 s
3.5	3.5	3.5	5-9/32"	MFB355	9858-9900008	20.75 s
3.5	3.5	3.5	9-25/32"	MFA355	9858-9900016	22.25
4.0	4.0	4.0	9-25/32"	MFA405	9858-9900009	24.50 s
5.0	5.0	5.0	9-25/32"	MFA505	9858-9900010	28.00 s
6.0	6.0	6.0	9-25/32"	MFA605	9858-9900011	31.25 s
10.0	10.0	10.0	16-1/2"	MFD106	9858-9900012	50.50 s
15.0	15.0	15.0	23-1/2"	MFE156	9858-9900013	71.75 s
20.0	20.0	20.0	30-1/2"	MFF206	9858-9900014	89.75 s


1 1/16"
27mm
1/2"
12.7mm
2 15/16"
74mm
1/2
12.7mm
13/16"
20.5mm

MIL-R-29A Type MFC

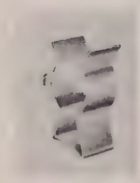

1 1/16"
27mm
17/32
13.5mm
1/16
1.6mm
5 9/32 OR 9 25/32
134.5mm. 251.7mm
1/16
1.6mm
17/32
13.5mm
1 5/32
29.4mm

MIL-R-29A Types MFB and MFA


1 1/2"
38.1mm.
1 1/2"
38.1mm.
1 5/32
29.4mm
SEE TABLE

MIL-R-29A Types MFD, MFE, MFF

MOUNTING CLIPS FOR TUBULAR RESISTORS



CAT. NO.	TYPE	PRICE
9808-0029046	MFC	$0.75 per pair
9808-0029047	MFA, MFB	0.90 per pair

WESTON INSTRUMENTS, INC.
WESTON - NEWARK DIVISION
614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114

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Circular 01-408-E
September 1969

Printed in U.S.A.

01-409-B
APRIL 1969

WESTON
THERMAL WATT CONVERTER
WESTON

Model 878

WESTON THERMAL CONVERTERS

MODEL 878
Two Element Polyphase Watt Converter
MODEL 868
Single Element Watt Converter
MODEL 869
Voltage or Current Converter

FOR CONVERTING A-C WATTS — VOLTS — AMPERES TO D-C MILLIVOLTS

Rapid Response, for Recording and Control, Totalizing or Remote Measurement

Weston Thermal Converters are used in the measurement of a-c power, current and voltage by converting these values to a d-c voltage which can then be measured by conventional d-c instruments and recorders.

Probably of greatest importance, particularly to the utility industry, is the thermal watt converter; Model 878 in the polyphase type and Model 868 as a single phase unit. The polyphase type which is most commonly used is shown in the illustration and consists basically of a set of potential transformers, a pair of saturating current transformers, and a bank of thermoelements all self-contained.

If a thermal watt converter is connected in a circuit in the same manner as any conventional wattmeter, a d-c output voltage will be produced proportional to the power in watts. This applies without regard to the current level or power factor down to 75%, with or without load. It also applies to the potential although in general this is maintained within 20% of the nominal 120 volt rating.

CHARACTERISTICS—MODEL 868 AND 878

Although a thermoelement system would appear to be subject to undue hazard because of overloads the design of the current transformer system embodies saturating transformers having nickel alloy cores which saturate and limit the current passing through the thermoelements themselves. For example, 10 times normal current (50 amperes on a 5 ampere device) may be applied for ½ second without damage.

The single phase unit is designed to give an open circuit output of 50 millivolts when connected to a 500 watt load; the polyphase Model 878 has an output of 100 millivolts when connected to a 1000 watt load, each element being adjusted to 500 watts. The internal resistance at the output binding posts is 0.6 ohm per element, thus allowing enough power to be drawn so that indicating instruments as well as null balance recording devices can readily be operated.

The Model 878 is essentially two complete single phase systems having their outputs connected together in series. This polyphase meter can be used for taking the sum of two single phase loads from entirely separate sources which may even be at slightly different frequencies.

The speed of action is very rapid and the d-c millivolt output rises to 90% of its final value in 0.35 second; to 99% in 0.7 second.

It should be noted that in the watt and current converting systems protection is had through the saturation of a current transformer and it is, therefore, necessary that the frequency of the system on which the unit is used be specified; the unit can be used on frequencies other than specified but on materially lower frequencies the output will fall off at full load and on frequencies higher than this rating the overload protection will be reduced.

APPLICATIONS

Thermal converters find their greatest usefulness in the ease with which the d-c output can be used to actuate measuring instruments of the various types. More specifically, since the several circuits are insulated from each other, millivoltages representative of a-c power in various power systems or individual generators of distribution networks can be added to obtain a total. In so doing, it is necessary that the ratio of millivolts to KW of primary power be the same in each of the units totalized. This may most readily be accomplished through the use of input transformers having the same watt ratio, although if this is difficult to accomplish the output network can be modified to secure the same proper end result. Total values can be so obtained, indicated and recorded of the power output of all

Continued on Other Side

Applications (Cont'd)

the generators in the power plant, for example, or of the summation of the power outgoing on a group of feeders. Alternatively, through telemetering systems of various types, totalizing over large sections of the country may be accomplished.

Polyphase vars can be measured by using a phase shifting autotransformer.

The output circuit of the Model 878 has an internal resistance of approximately 1.2 ohms and that of the Model 868 has approximately 0.6 ohms. This will allow for the operation of a multiplicity of indicating instruments, a feature not ordinarily found in devices of this general type. Through the use of relatively simple resistance dividing networks the individual output of each thermal converter can be indicated as well as any group of sub totals and final totals. By the same token, the totalized millivoltage may be applied to a telemetering system or to a recorder of any kind responsive to millivolt values, again for the recording of any of the individual or group values.

In many instances it is undesirable to run a-c lines to a wattmeter at some distant location. In such cases the thermal converter can be connected to the a-c line at a convenient point and d-c lines run to any suitable d-c instrument for display of the power reading. A particular case in point here is the display of the power output of a turbo-generator through the use of the Weston Model 525 projection instrument whereby the output of the generator can be indicated on a 10 foot scale on a screen.

FIELD ADJUSTMENT

For field adjustment, arrangements have been made to adjust both the output network as well as the input to each potential system. The potential adjustments allow for a minor calibration adjustment on the open circuit output millivolts as may be deemed desirable by the meter laboratory making the installation. The output adjustment consists of a pair of resistance spools across the output. These spools are adjusted so that the output bear a particular fixed relation to other converters in the system where totalizing is to be accomplished. As shipped both spools are adjusted to approximately 100 ohms and can be adjusted in the laboratory to a total of 100 ohms with a tap as may be required for any particular system arrangement.

ACCURACY

The d-c output of the Model 878 watt converter, is 100 MV for 500 watts in each of its 2 elements or 0.1 MV per watt open circuit. This value is maintained to within ±1% for direct or reversed energy flow under the following conditions:

a. Vertical mounting
b. Applied voltage 113 to 123 volts
c. Frequency (as listed)
d. Power factor 75% or higher
e. Up to full rated current, 5 amperes
f. D-C output is linear
g. After voltage has been applied for at least 1½ hours (Time required to bring the complete assembly to normal operating condition).

With voltage only applied, the parasitic output will be less than ±0.2 millivolts.

Reversal: A reversed current flow will also reverse the D-C millivolt output.

Losses (burdens): Approximate losses (burdens) for potential circuit at 115 volts, 60 cycles—6.4 watts, 6.4 volt amperes; current circuit at 5 amperes, 60 cycles—0.55 watts, 0.55 volt amperes.

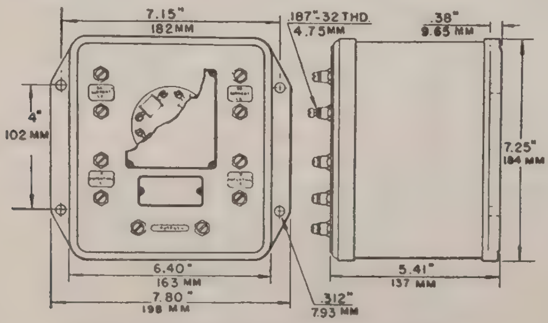
MODEL 869 CURRENT AND OR VOLTAGE CONVERTERS

Thermal voltage and current converters are also available as Model 869 which is identical in dimensions to Model 868, but with only two input terminals.

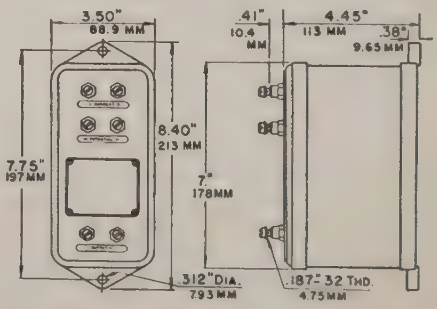
The potential converter has a d-c output of 36 millivolts for 120 volts a-c input. The current converter has a d-c output of 25 millivolts for 5 amperes a-c input. The millivolt output follows a square law with regard to input voltage or current so in practice the Model 869 is used singly since the summation of outputs of two or more converters would be meaningless. Overload and response characteristics are similar to the Model 878. Other practical ratings can be supplied subject to negotiation.

Thermal Watt Converter			Model 868	Model 878
Input		Frequency	Output	
120 volts	5 amp.	56-64 cycles	50 mv d-c	100 mv d-c
120 volts	5 amp.	46-54 cycles	50 mv d-c	100 mv d-c
120 volts	5 amp.	375-425 cycles	50 mv d-c	100 mv d-c
120 volts	5 amp.	23-27 cycles	50 mv d-c	100 mv d-c

Model 869 Voltage Converter			Current Converter (869)	
Input	Output	Frequency	Input	Output
120 volts	36 mv d-c	56-64 cycles	5 amps	25 mv d-c
120 volts	36 mv d-c	23-27 cycles	5 amps	25 mv d-c
120 volts	36 mv d-c	375-425 cycles	5 amps	25 mv d-c
120 volts	36 mv d-c	46-54 cycles	5 amps	25 mv d-c



Model 878—Approx. Weight 10 lbs. (4.53 Kgs.)



Model 868—Approx. Weight 5 lbs. (2.26 Kgs.)

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PRICE LIST
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DEC. 3, 1967

SUPERSEDES ISSUE
DATED 10/31/66

All Prices Subject to Change Without Notice and are F. O. B. Factory, Newark, N. J.

MODEL 868 SINGLE ELEMENT THERMAL WATT CONVERTER

120 volts	5 amps.	56- 64 cycles	50 mv dc*	868-9901001 s	$260.00
120 volts	5 amps.	46- 54 cycles	50 mv dc*	....	286.00
120 volts	5 amps.	375-425 cycles	50 mv dc*	....	365.00
120 volts	5 amps.	23- 27 cycles	50 mv dc*	....	365.00

MODEL 869 VOLTAGE CONVERTER

120 volts	56- 64 cycles	36 mv dc*	869-9201001	$260.00
120 volts	23- 27 cycles	36 mv dc*	....	288.00
120 volts	375-425 cycles	36 mv dc*	....	↓
120 volts	46- 54 cycles	36 mv dc*	....	

MODEL 869 CURRENT CONVERTER

5 amps.	56- 64 cycles	25 mv dc*	869-9202001	$260.00
5 amps.	23- 27 cycles	25 mv dc*	....	288.00
5 amps.	375-425 cycles	25 mv dc*	....	↓
5 amps.	46- 54 cycles	25 mv dc*	.. .	

MODEL 878 TWO ELEMENT POLYPHASE THERMAL WATT CONVERTER

120 volts	56- 64 cycles	100 mv dc*	878-9901001 s	$430.00
120 volts	46- 54 cycles	100 mv dc*	....	460.00
120 volts	23- 27 cycles	100 mv dc*	....	560.00
120 volts	375-425 cycles	100 mv dc*	....	547.00

MODEL 939 SINGLE PHASE POWER FACTOR TRANSDUCER

110-120V	.85-1.0-.85 P.F.	1-5 Amp.	Any Freq. from † 180-10,000	500-0-500 Mics	$[illegible]36.00

† Accuracy ± .02 PF at Specific Adjusted Freq. at 115V

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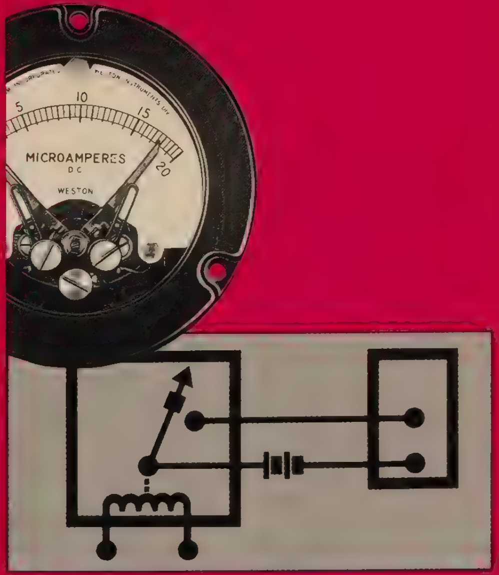
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Instrument Relays

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WESTON TWINTACTS

SENSITROL CORMAG

MagTrak

contents

GENERAL SECTION

INTRODUCTION 1
RELAY PRINCIPLES, CONSTRUCTION AND OPERATION 2
SENSITIVE CONTACT TYPE INSTRUMENT RELAY 3
MAGNETIC CONTACT TYPE INSTRUMENT RELAY 5
LOAD CURRENT CONTACT AIDING (LCCA) RELAY 8
NON-PHYSICAL CONTACT TYPE RELAY 9
OPTIONAL FEATURES 10
RELAY SELECTION CHART 11
HOW TO ORDER WESTON RELAYS 12

DETAILED SPECIFICATIONS

SENSITIVE RELAYS

Model 534 Sensitive Relay 13
Model 730 Sensitive Relay 15
Model 813 Miniature Sensitive Relay 16
Model 1081 Sensitive Miniature Hermetically Sealed Relay 17

SENSITROL® (Magnetic Contact) Relays

Model 705 SENSITROL® Relay 18
Model 723 Sealed SENSITROL® Relay 22
Model 813 Miniature Sensitrol Relay (external reset) 23
Model 1085 Miniature Sensitrol Relay (internal reset) 25
Model 1092 All Purpose Sensitrol Relay 26

LCCA RELAYS

Model 1073 4½″ MagTrak® Relay 27
Model 1093 2½″ Sealed Ruggedized Relay 29
Model 1097 3½″ Sealed Ruggedized Relay 31

NON-PHYSICAL CONTACT RELAYS

Model 1075 Non-Physical Contact Relay 32
Models 1930/1940 Non-Physical Contact Relays 34

ACCESSORIES

POWER SUPPLIES 37
POWER RELAYS 38
OTHER WESTON® PRODUCTS 39

WESTON FIELD FORCE 40

NOTE: Prices available on application

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introduction

The instrument relay is a permanent magnet moving coil mechanism with contacts added to provide switching action. It can be used to sense either current or voltage and has found widespread applications for both control and alarm requirements. It is supplied in a variety of sizes and shapes and usually gives a visual indication as to the state of the system being controlled. The instrument relay is the most sensitive type of electro-magnetic relay and can be operated by microwatt energy levels. This permits it to be used for sensing any condition which, by means of a transducer, can be converted to electrical energy. Even though the output of the transducer is small, a meter relay can often be used directly, thus eliminating the need for costly amplification.

A schematic diagram of the simplest type of instrument relay is shown in Figure 1. It consists of a permanent magnet moving coil mechanism, which has a moving contact mounted on the pointer and a fixed contact rigidly mounted either to a stationary part of the instrument, or to a rotatable member which is adjustable from the front of the instrument. The fixed contact is mounted in the path of travel of the pointer so that the moving contact strikes the fixed contact when sufficient current is applied to the terminals of the instrument, thus closing the load circuit. The load circuit is, of course, the circuit being controlled.

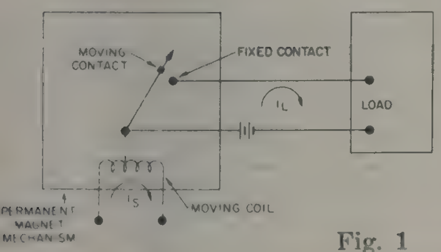


Fig. 1

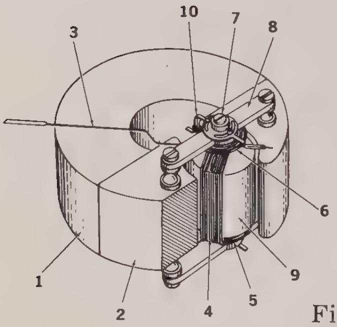
The first designs, known as the sensitive contact type, depended solely upon the current flowing through the moving coil for maintaining the contacts closed. In this type, the contact force is variable and, where only minute currents are available, the contact force is limited and the contacts have a tendency to chatter and act erratically. To improve reliability and increase the scope of application, additional contact force was necessary. Additional contact force is provided by one of the following two methods:

1. The use of magnetic contacts or magnets to increase the contact force. Normally called a magnetic contact relay.

2. The use of an additional winding on the moving coil called an "aiding coil". This is known as a "load current contact aiding" relay (LCCA).

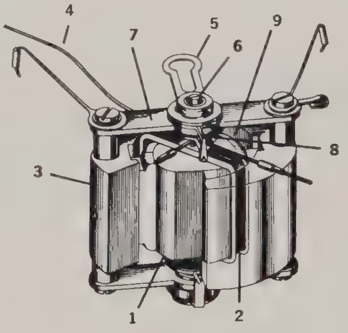
relay principles, construction & operation

The permanent magnet moving coil d-c mechanism is the heart of the instrument relay. There are two basic magnetic circuits effectively used today in permanent magnet moving coil mechanism applications. These include the external magnet design which is illustrated in Figure 2 and the internal magnet (or core magnet) design as shown in Figure 3. In the CORMAG® system, the magnet itself is placed inside the moving coil to form the core of the mechanism and the outer magnetic return path is provided by a ring of soft iron. External magnet mechanisms permit extremes in deflectional sensitivity whereas the CORMAG® system permits size reduction and self-shielding against external magnetic influence.



1. **Magnet**
2. **Pole Piece**
3. **Pointer**
4. **Moving Coil**
5. **Bottom Control Spring**
6. **Top Control Spring**
7. **Jewel Screw**
8. **Top Bridge**
9. **Core**
10. **Top Spring Abutment**

Fig. 2



1. **Permanent Magnet Core**
2. **Moving Coil**
3. **Yoke (return path)**
4. **Pointer**
5. **Top Spring Abutment**
6. **Jewel Screw**
7. **Top Bridge**
8. **Top Control Spring**
9. **Air Gap**

Fig. 3

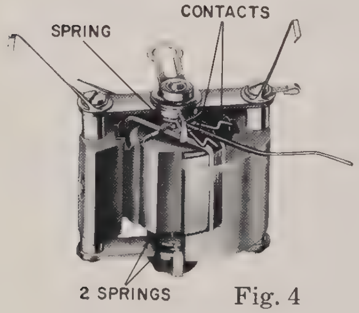


Fig. 4

The basic structure is altered as shown in Figure 4 to provide switching action. Moving contacts are mounted on the pointer and a third spring is mounted on the moving coil to provide electrical connection for the load current.

BALLISTICS

The ballistics of instrument relays are defined in terms of damping and response time. Instrument relays are generally designed to be critically damped or overdamped to avoid making spurious contact due to overswing of the pointer. Damping is obtained by: 1) The eddy currents induced in the metallic frame that supports the moving coil, and 2) the current that flows in the moving coil due to induced voltage, while the moving coil is in motion in the magnetic field. The degree of damping obtained from Point Number 2 is affected by the impedance of the source energizing the moving coil . . . the lower the source impedance the greater the damping.

®Trademark

The response time is directly dependent upon the damping and the particular mechanism under consideration. The ballistic characteristics of a given instrument may be varied by selecting proper moving coil frames, coil resistances and control springs to meet the needs of most applications.

RELAY CONTACTS

The reliability of an instrument relay depends upon the reliability of the contacts. A good contact may be defined as one which has a resistance below 2 ohms, and good mechanical wear characteristics. This, in turn, depends upon contact material, contact shape, contact force, the type of engagement of the contacts, cleanliness of the contacts, and the wiping action of the contacts as contact is made. These factors are functions of the circuitry associated with the contacts. Contact material, shape, engagement and wiping action are controllable by design and contact cleanliness is controlled by quality control procedures in manufacturing. Contact contamination which occurs after a period of time due to accumulation of films from airborne grease, dust, moisture, etc., is not controllable in an unsealed relay. This means that the mere touching of contacts is not sufficiently reliable and the importance of contact force must be emphasized. A general curve, shown in Figure 5, supports this by showing the reduction in contact resistance for an increase in contact force. Experience indicates that a 10 milligram contact force is necessary for reliable contact performance.

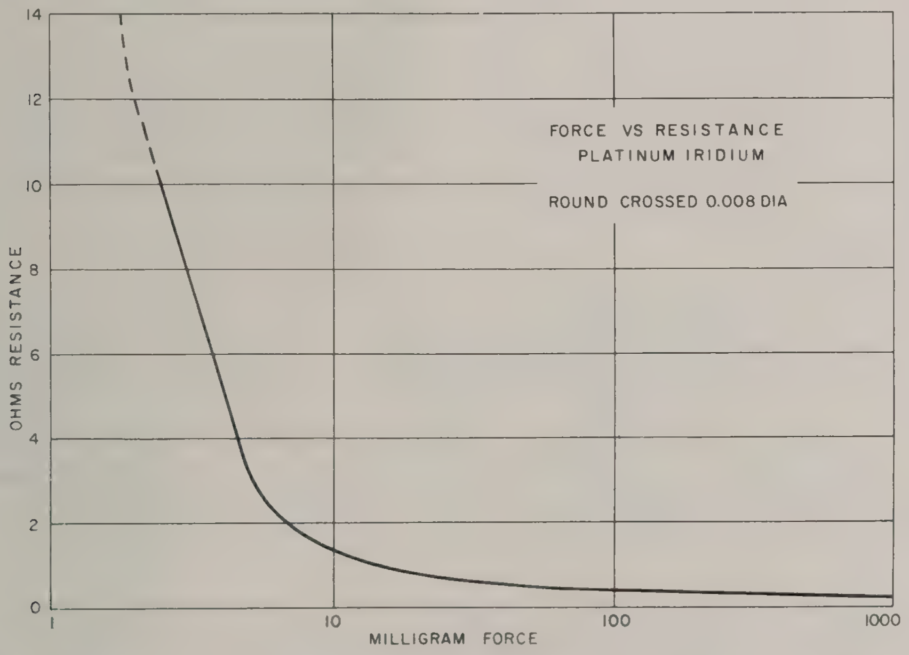


Fig. 5

sensitive contact type instrument relays

Specific contact designs and methods of obtaining additional contact force are more fully described in the following sections which cover the various types of instrument relays.

The sensitive type relay depends solely upon the current flowing through the moving coil for maintaining the contact pressure. This means the contact pressure will vary as the

SENSITIVE CONTACT TYPE (continued)

current in the moving coil changes making this a poor relay to use where the current is very small or the current level varies widely after contact is made. It does have the advantage of being self-resettable as soon as the current drops below the contact set point.

CONTACT MATERIAL

In view of the limited amount of contact force available in a sensitive type instrument relay, the contact material should have a low resistance, should not form oxide films easily, and should be relatively flexible.

Two materials have been used most successfully: platinum-iridium and gold (used as a plating). Platinum-iridium is more generally used because of its hardness, low and uniform contact resistance, and high resistance to film formation and arc erosion. Gold, on the other hand, has a slightly lower contact resistance; however, it is softer than platinum-iridium and not as flexible. Generally, gold contacts wear out faster.

CONTACT DESIGN

Because of the relatively low contact force, the contact area must be kept small in order to provide maximum unit force. In addition, one of the contacts is made flexible to provide a wiping action which keeps contacts clean.

Various mechanical designs, such as a sharp-pointed contact closing against a flat surface produces a small contact area, however, one of the most satisfactory designs consists of two cylindrical rods which close at right angles giving a point contact as shown in Figure 6.

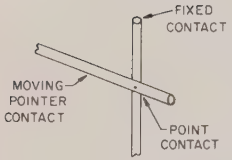


Fig. 6

In addition to point contact, this design gives a wiping action when flexible contact material is used.

To further improve the wiping action two cylindrical rods can also be used as the fixed contact as shown in Figure 7. In this design, the moving contact (the single rod) strikes on one rod of the fixed contact, bends it to the point where the moving contact makes contact with the second rod giving a wiping action as the movable contact slides over the surface of the fixed contact. By using two rods, more flexible cylindrical rods of smaller diameter may be used and the mechanical strength is still maintained.

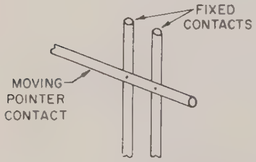


Fig. 7

CONTACT CAPACITY

The use of precious metals for contact material, coupled with low contact force, limit sensitive contact capacity to about 6 volts at 35 milliamperes (See specifications for details). At higher voltages electrostatic forces may cause premature attraction between the contacts and also produce metal-bridging effects. These factors will cause erratic operation at the higher voltage levels.

INSTRUMENT ACCURACY

The sensitive type of relay is not generally provided with an accurately calibrated scale and many have no scale. Where a scale is supplied, it is mainly used for a rough approximation of the variable being measured rather than for accurate measurement.

CONTACT ACCURACY

The sensitive type relay is not intended for precise alarm or control applications, resulting from slowly changing signals but is ideal as a triggering control or alarm, that is, where the moving coil current changes suddenly so that the contacts close with an impact.

CONTACT REPEATABILITY

The ability of the contacts to close repeatedly at the same predetermined value is dependent upon the particular application for which the relay is being used. If the contact force is sufficiently high, the repeatability may be as good as 1%. As the contact force is reduced, however, the repeatability inaccuracy becomes greater.

CONSIDERATIONS FOR APPLICATION

Even though the actuating current must be sufficient to maintain satisfactory contact force, a sensitive contact type instrument relay operates at current levels which generally do not require amplification. This feature coupled with the ability of the contact arm to float freely and "make" or "break" contact with a simple increase or decrease of the sensing current, have made it a useful relay. Its characteristics are such, that it should be used under conditions of fast make and break.

The following factors must be given careful consideration when specifying its use:

1. Areas with little or no vibration should be chosen when mounting.
2. Contact capacity should be limited.
3. Slow "make" and "break" operation should not be required as this will result in reduced life of contacts.

When these factors cannot be met, strong consideration should be given to the use of magnetic contact, LCCA, or Non-Physical Contact relays.

magnetic contact type instrument relay

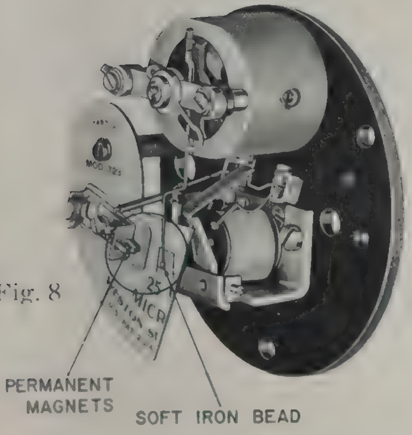


Fig. 8

The magnetic contact relay is constructed similarly to the sensitive type relay except that the contact on the pointer is made of soft iron and the fixed contacts are small permanent magnets as shown in Figure 8.

OPERATION

This device operates in 2 stages as shown in Figure 9 and described below:

1. As current is applied to the moving coil, the pointer deflects toward the magnetic field of the permanent magnet.
2. When the soft iron pointer bead enters the magnetic field, it is attracted to the permanent magnet and closes the contact circuit.

The only current required is that necessary to deflect the soft iron bead contact into the magnetic field of the fixed permanent magnet contact.

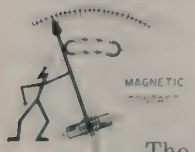


Fig. 9

MAGNETIC CONTACT TYPE (continued)

CONTACT FORCE

The contacts make solidly with a force of 2 to 3 grams, which is several hundred times greater than that obtained with a sensitive-contact type instrument relay of the same sensitivity. The increased force results in lower contact resistance and permits the device to be used where vibration is present without ill effects.

CONTACT MATERIAL

The movable contact is made of soft iron, heavily plated with silver and is solidly fastened to the pointer of the relay. The permanent magnet fixed contacts are made of workable magnetic material such as cobalt iron or cunife, which is also heavily plated with silver.

CONTACT DESIGN

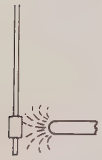

ACTUAL CONSTRUCTION
MAGNETIC CONTACT

Fig. 10

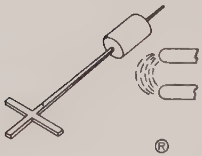

TWINTACTS®
Contact System

Fig. 11

Even though the contact force is considerably higher than that attainable in a sensitive contact type instrument relay, it is desirable to obtain maximum unit force. For this reason, the movable contact is made cylindrical in shape and the fixed contact has a spherical tip as shown in Figure 10 to give point contact.

Original designs consisted of a single magnet as shown in Figure 10, however, in later designs, it was found that improved performance resulted when the fixed contacts were supplied in pairs (called **TWINTACTS**® contact system) as shown in Figure 11.

These contacts are charged oppositely so that the movable contact is attracted by the field produced and comes to rest in a neutral position with the soft iron bead attracted by both magnets. As the soft iron bead slides on the magnet surfaces, a wiping action is performed on the surface of the contact, removing contaminents and improving contact performance.

CONTACT CAPACITY

This type of instrument relay has a nominal contact rating of 100 milliamperes at 115 volts, a-c or d-c. The limiting factor is the spiral spring which completes the contact circuit. With special designs this capacity may be increased to 300 milliamperes.

INSTRUMENT ACCURACY

The magnetic contact type of relay is not generally provided with accurately calibrated scales and many have no scales. Where a scale is supplied, it is mainly used for a rough approximation of the variable being measured rather than for accurate measurement.

CONTACT ACCURACY

The contact accuracy is a function of the ability of the operator to adjust the magnetic contact set point. This can easily be adjusted to an accuracy of 5% or better.

CONTACT REPEATABILITY

Once the fixed contact has been set at the predetermined point within the specified limits, this type of relay will make contact at that point with a repeatability tolerance within 1%. It is this ability of the magnetic contact relay to repeat the preset value within 1% that is its greatest advantage to designers. Contact accuracy tolerance is less important since it is often possible to make minor adjustments within a system to compensate for the general accuracy tolerance.

CONTACT LIFE

This type of contact has a life greater than 10 million operations at rated current of 100 milliamperes and voltage of 115 volts a-c or d-c.

RELAY SENSITIVITY

Since the instrument movement will not be called upon to supply any contact force, it can be made more sensitive than the movement used in a sensitive contact relay. This means that a relatively small mechanism may be used with resultant saving in weight and size, even when high sensitivities are required. The actuating current can be low, which provides a power transfer (amplification ratio) of some 10^9 times the energy required to actuate the moving coil of the instrument. This is approximately 5,000 times greater than the ratio which can be obtained when using a sensitive contact relay.

RELAY RESET

When the magnetic contacts of the relay close, the restoring torque of the meter is insufficient to open them, therefore some auxiliary means of separating the contacts is necessary. Manual resetting or resetting by means of electrical solenoids are the methods employed. Some examples of these methods follow:

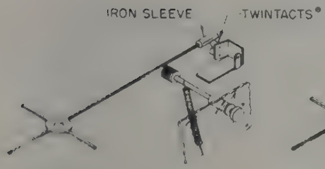


Fig. 12a

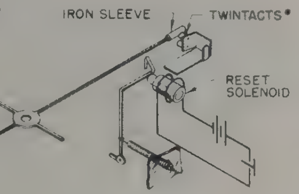


Fig. 12b

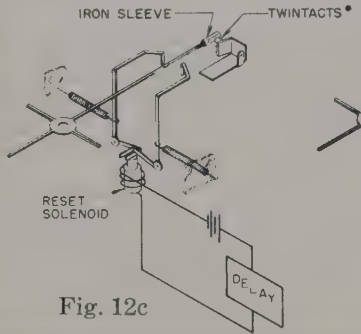


Fig. 12c

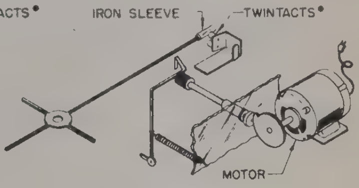


Fig. 12d

Fig. 12a Manual reset — a force is applied directly to the arm to break the contact.

Fig. 12b Remote push-button reset — to actuate a solenoid which mechanically breaks contact.

Fig. 12c Automatic reset — contacts are opened by a time-delay device operating the solenoid.

Fig. 12d Periodic reset — by use of a motor-driven cam.

CONSIDERATIONS FOR APPLICATIONS

In view of its ability to operate reliably even after extended periods of non-operation, the magnetic contact instrument relay has been used in more diversified applications than the sensitive contact type instrument relay. Its locking feature has permitted its use where vibration is present. It can operate at higher sensitivities since its contact force is not a function of the sensitivity. It has increased contact capacity and can switch A-C as well as D-C loads. An inherent feature in this design is that magnetic-contact instruments relays require reset.

This type of relay has a short deflection angle; therefore, its reading accuracy is limited. If greater accuracy of absolute values is required a long-scale instrument with lock-in control features should be used. (See LCCA section, Page 8.)

load current contact aiding relay (lcca)

This relay does not depend entirely on the sensing coil for contact pressure. The moving element of this type of relay contains an additional winding or locking coil wound on the same frame as the sensing coil and connected in series with the load as shown in Figure 13.

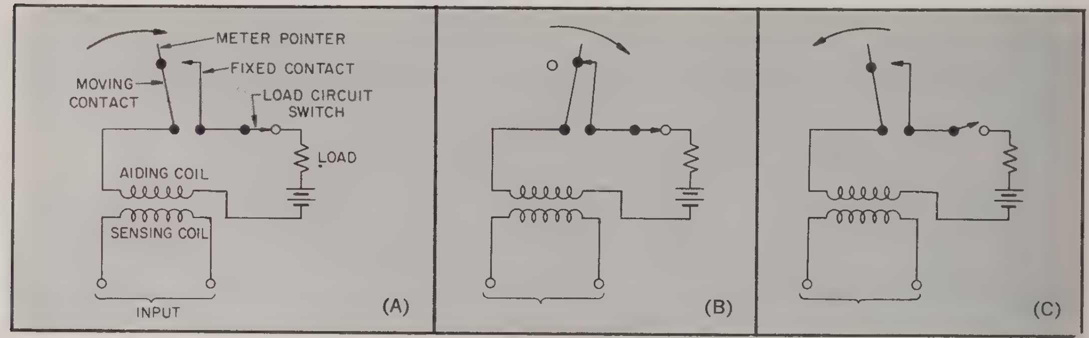


Fig. 13 The LCCA relay contains an aiding coil in the load circuit which is not energized as long as the pointer remains below setpoint (A). When the pointer reaches setpoint, the load circuit is completed (B), and the aiding coil provides an additional torque to maintain contact. The pointer no longer responds to the input signal. Reset occurs only when the load circuit is opened at another set of contacts (C). The spring torque assures a positive break.

When the sensing coil moves the pointer so it makes contact, the load circuit and the aiding coil are energized. The torque developed by the aiding (locking) coil increases and maintains contact pressure. The contact pressure which is developed is many times greater than that of a sensitive-type relay. This permits the LCCA relay to operate on smaller input signals, since it does not depend on the moving element current alone, to maintain contact.

A decrease in signal input will not break the contact. The load circuit must be opened to break the contact. This can be done: 1) manually, 2) with a timing motor, or 3) with a pulsing circuit. When the load circuit is broken, the spring loaded moving contact is driven down scale a short distance. If the signal is still above the preset value, the contact will remake.

The spring pressure on the contacts prevents sticking and allows operation at higher voltages and current than that allowable for sensitive relays. The LCCA relay is highly reliable and ideally suited to alarm systems or slowly changing input signals.

Reliability of the LCCA relay is a function of contact voltage and contact pressure. The contact pressure depends on the value of the load current and the number of turns in the aiding coil. Since the coils are designed for optimum pressure at a stated current, operating values of current should be specified rather than maximum values. If the coil requirements are overrated, contact pressure at normal operating currents may be insufficient.

Aiding coils are usually designed with a 100% overload safety factor for load current. Aiding coils may be dual (high and low) or single and several arrangements are possible as shown in Figure 14.

The Model 1073 MagTrak® meter relay combines the high sensitivity of d-c permanent magnet indicating instruments, the reliability of magnetic contacts, and the locking and resetting features of the load current contact aiding type. Model 1073 features powerful initial contact pressure (100 times greater than most relays), sure make and break, single push button reset on front, set points readily adjustable and an auxiliary control package as a plug-in unit for remote mounting.

CONTACT CAPACITY

Nominal rating of the contacts in the LCCA type relay is 5-25ma at 24-125 volts d-c. The LCCA relay can operate with d-c loads only because the aiding coil requires direct current for proper operation.

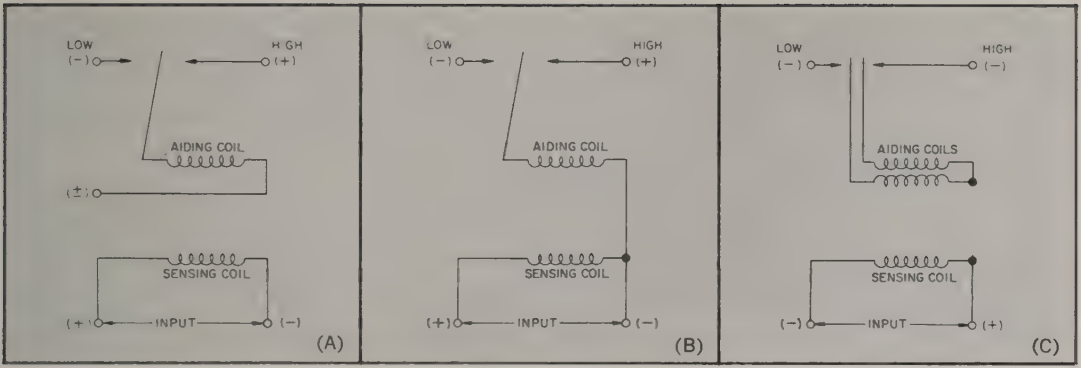


Fig. 14 Dual contacts (high and low) may be provided, with or without isolation of the aiding coil from the sensing coil, as in (A) or (B). The fixed contacts must be of opposite polarity so that the aiding coil torque is properly directed to maintain pressure on either contact. To operate a dual contact relay from a two-terminal power supply—both fixed contacts of same polarity—two aiding coils are required as in (C). These coils are wound in opposite directions to maintain the correct direction of force.

INSTRUMENT ACCURACY

The LCCA instrument can be supplied with an accuracy of 2% of full scale. Scale angles of 86° to 100° are provided with scale lengths equivalent to those of standard panel meters.

non-physical contact type relay

This is a new concept in the field of instrument relays. It is unique in that control is achieved without physical contact. Switching is accomplished by a system which may utilize a solid state switching circuit to eliminate the usual metal-to-metal relay contacts. Since contact is not made physically, automatic resetting is a fundamental part of the design. In addition, the pointer of the meter may continue to read beyond the set point after contact has been made.

The main components of this type of relay are: 1. a vane or light interrupter related to the pointer position 2. a photoconductive cell associated with the moveable index arm 3. a lamp circuit 4. fundamental switching circuitry.

OPERATION

Non-physical meter relays work on the principle of a changing photocell resistance with respect to the intensity of light illuminating that cell. Primarily the point at which the maximum change of cell resistance occurs is the point where the cell goes from a fully illuminated to a fully covered condition. It is at this point that meter-relay control functions may be initiated. The physical location of the index arm indicates the point at which switching action will occur. A typical operation cycle could be indicated by the following:

With lower and upper index arms located at the lower and upper ends of the meter scale, and with the moving coil energized to some intermediate reading, a change in the moving coil current which brings the pointer in line with either index arm will initiate switching action. The photocell resistance change is incorporated with additional circuitry which, in turn, operates a power relay or SCR circuit. Returning the moving coil to its intermediate position causes the unit to switch back to its former condition.

SENSITIVITY

When a taut band mechanism is employed as the meter mechanism a sensitivity of 10 microamperes can be achieved (see Model 1075 Page 32). Pivot and Jewel mechanisms have lower sensitivities (see Models 1930/1940, Page 34).

ACCURACY 2% as a meter readout is standard. **LAMP LIFE** 8,000 Hours minimum (Model 1075) **DEAD ZONE** The difference in actuation point when the pointer is moving up or down scale is normally one degree or 1%.

optional features

SUPPRESSION CIRCUITS

All suppression statements in this catalog cover mechanical suppression of current and voltage (usually one (1) to two (2) scale lengths maximum as indicated by model). Voltmeter circuits requiring increased readability for particular control functions may have their scales expanded electrically (usually up to ten (10) scale lengths maximum), depending on range.

Electrical suppression is provided through the use of a zener diode bridge network. Voltage ranges as low as six (6) to eight (8) volts and up to 500 volts may be supplied having an accuracy of ±0.5% of mid-scale and temperature coefficient of ±0.1% per °C.

MOUNTING

Standard mounting data will be found under specifications for each model. Special variations available upon request.

SCALES

Scale information will be found under specifications for each model. The standard practice is to have figures and caption agree with the measured quantity (i.e.: milliamperes or millivolts), but variations are available at a surcharge.

CONNECTION LEADS

Weston does not supply connection leads as a standard practice.

METER OVERLOAD PROTECTION

The basic meter movement is generally able to withstand a momentary overload of 10 times the full scale value without mechanical or electrical damage.

To provide meter protection, the meter circuit may be protected by a diode (usually silicon). The diode acts as a high impedance shunt until its point of conduction and at that time bypasses the overload current. These circuits are generally designed for each application.

relay selection chart

1. This chart indicates features available in a Model as a standard unit. On special order almost all features can be modified.
2. All features checked for a model are available, but not necessarily all at the same time. For example: zero center and suppressed zero cannot be provided simultaneously. For this reason features desired should be specified.
3. Applications are checked for conditions normally expected. A unit not checked does not mean impossibility, but rather inadvisability.
4. The term "Automatic" in the application section is used to mean self contained automatic reset when the input to the sensing coil is reduced. All models can be used with external circuits to provide automatic reset.
5. The chart is intended to narrow the choice to a few models. The catalog and/or the local Weston representative will assist in making the final decision as to the particular relay that best suits the use. Circuit diagrams are helpful in this respect. In addition to the features on the chart, all other details should be included, such as, mounting position, case style, specific range, scale caption, etc.

RELAY SELECTION CHART

CHARACTERISTIC	534	705	723	730	813 Sensitrol	813 Non-Locking	1073	1081	1085	1092	1093 LCCA	1097 LCCA	1075	1930	1935	1940	1945
SENSITIVITY																	
Normal Max. Full Scale. Sensitivity in μa DC given for zero left unit. Use as span for zero center i.e. 4 mics or 2-0-2. Greater sensitivity available depending upon conditions.	15	1	2	400	4	100	10	100	4	50	50	50	10	50	50	50	50
MECHANISM TYPES																	
Magnetically Shielded		*	*				*				*	*	*	*	*	*	*
Temperature Compensated	*	*	*	*	*	*	*	*	*	*	*	*	*	X	X	X	X
Automatic Cold End Compensation		*	X									*	*	X	X	X	X
Spring Back Jewels	*	*	*	*	*	*		*	*	*	*	*		*	*	*	*
Miniature Size					*	*		*	*								
Sealed Unit (Watertight)			*					*			*	*					
High Vibration Resistance									*		*	*					
Taut Band													*				
SCALES																	
Calibrated Scales		*	*	*	*		*				*	*	*	*	*	*	*
Scale Length 50° or more		*									*	*	*	*	*	*	*
± 2% Accuracy as Indicator							*				*	*	*	*	*	*	*
Suppressed Zero	*	*	*	*	*	*	*	*	*		*	*	*	*	*	*	*
Zero Center	*	*	*	*	*	*	*	*	*		*	*	*	*	*	*	*
CONTACTS																	
Dual Contacts	*	*	*	*	*	*	*	*	*		*	*	*				
Adjustable Contacts		*					*			*	*	*	*	*	*	*	*
1% Repeatability	*	*	*		*		*		*	*	*	*	*	(2% Repeatability)			
Magnetic Contacts		*	*		*				*	*							
LCCA Contacts											*	*					
Non-Locking Contacts	*			*		*	M	*					*	*	*	*	*
DC Contact Load 35 ma at 6 v	*			*		*		*					*				
DC Contact Load to 100 ma to 125 v		*	*		*		‡		*	*	*	*	‡	‡	*	‡	*
DC Contact Load to 300 ma to 125 v							‡				*	*	‡	‡	*	‡	*
AC Contact Load to 100 ma to 115 v		*	*		*		‡		*	*			‡	‡	*	‡	*
Contact Life Expectancy over 5 Million Operations		*	*		*		⊕		*	*	⊕	⊕	⊛	⊕	⊛	⊕	⊛
APPLICATIONS																	
DC Operation	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
AC Operation. External Rectifier (E) Self Contained Rectifier (S)	S	E	S		S		S		S	S	S	S	S	S	S	S	S
Automatic Control Sudden Change in Input	*			*		*	*	*					*	*	*	*	*
Control, Slow Change in Input	*	*	*		*		*		*	*	*	*	*	*	*	*	*
Alarm-Extreme Reliability Required (Contacts left unused long period of time)		*	*		*		*		*	*			*	*	*	*	*
Photoelectric Uses	*			*		*		*					*	*	*	*	*

‡ With External Power Circuitry.
⊛ Except 100,000 at 5a, 115 V a-c.

* Available now.
X Available soon.

⊕ Contact life expectancy over 1,000,000 operations.
M LCCA contacts plus MagTrak® contact system.

GIVE THIS INFORMATION:

1. Model Number, CATNO (when listed) and Type Number.
2. High or low contact adjustment (or both) on "fixed" contact relays. If single contact, state whether contact is to be made on increasing or on decreasing values. (Note that on zero center meters, contact is always made on increasing values in either direction.)
3. Case (flush or surface).
4. Mounting position, if other than standard.
5. Resistance — if it is important.
6. If solenoid reset is required, state reset coil voltage, and whether AC or DC.
7. When ordering a thermocouple actuated temperature relay, state range in °F or °C, cold end temperature, material and resistance of the thermocouple and leads to be used with the relay. Also state if cold end compensation is required.
8. If same relay has been purchased previously, refer to previous order, or mark order "repeat", giving if possible some reference such as previous sales order number, relay serial number, date, factory order(s) number, etc.
9. Where a special application is involved, it is of great assistance to have a circuit diagram showing where the relay is to be used. If auxiliary apparatus is employed, a complete description of it is very helpful.
10. For Model 1075, specify "WORK CURRENT" operation, if required.
11. Response time . . . if important.

In order to assure the best possible operation of a SENSITIVE or LCCA (Models 534, 730, 813, 1073, 1081, 1091, 1093, 1097) RELAY for any particular application, it is absolutely necessary that we be informed of the limiting conditions under which the relay is to be used. For example:

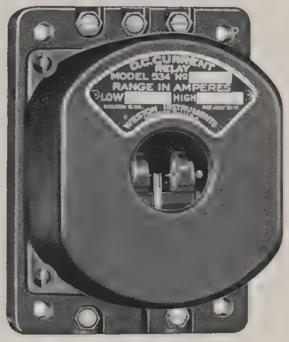
- What will be the values of voltage and current in the contact circuit?
- Is the circuit inductive or non-inductive?
- What are the values of resistance, inductance or capacitance, as known?
- Is any special accuracy required?

sensitive relays

MODEL 534

GENERAL: Model 534 is Weston's finest sensitive (non-locking) contact relay. Widely used for many years, it can provide contact action on as little as 7.5 microamperes. Spring-like, rare metal contacts on the movable contact arm provide a wiping or self-cleaning action, and open or close without need for resetting mechanism.

To provide optimum performance, the Model 534 is engineered to meet the specific requirements of the particular application. It is available either as a voltage or as a current relay, suitable for portable use or switchboard mounting. Unless otherwise specified, relays will be adjusted for vertical switchboard mounting.



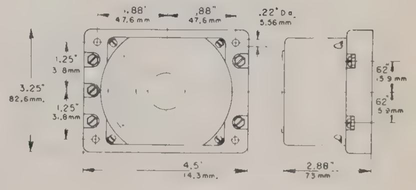
RANGES: Can be supplied self-contained with ranges as low as 7.5 microamperes or intermediate ranges up to 1 ampere. Higher ranges can be obtained through the use of appropriate 100 mv external shunts. Voltage ranges as low as one (1) mv can be supplied. Ranges of 50 volts or less are available in self-contained units. For ranges above 50 volts, external resistors may be required.

ACCURACY: See Range listing.

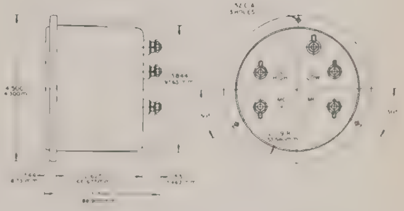
SCALE: None.

CONTACTS: Single or double fixed contacts. Capacity is 35 ma at 6 volts d-c non-inductive. (Can be 200 ma on most ranges. See Range listing.)

Suppressed Zero Type: High and low contacts are factory adjusted at specified current or voltage values of the same polarity. The minimum contact setting or the minimum difference between high and low contact settings is 7.5 microamperes. When used in controls to hold current or voltage to a desired value, the difference between high and low settings can be as little as 1% of the nominal value except for the more sensitive ranges.

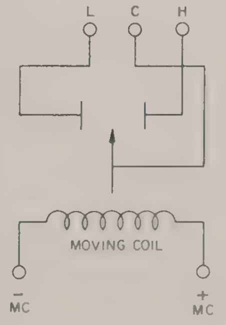


Surface Type



Flush Type

Zero Center Type: Right and left fixed contacts are factory adjusted at the desired values of positive and negative polarity, with the moving contact between the two for zero current or voltage moving from zero only when the relay is energized. Minimum range contact settings are 7.5-0-7.5 microamperes.



Front View

ZERO SUPPRESSION: In general, maximum suppression available is 12 times the difference between high and low contacts. See listed ranges. (Please note that on suppressed zero or zero center current units, the range is considered to be the lowest value to close contact or the difference between the low and high contact, whichever is less.)

CASE STYLE: Surface case is standard.

MOUNTING: Vertical panel mounting on non-magnetic panel is standard; units can be calibrated for magnetic panels on request.

RESISTANCE: See the values under Range listing.

DIELECTRIC: 500 volts rms between circuits (test).

APPROX. WEIGHT: 2 lbs. (0.9 kg) (surface); 3 lbs. (1.36 kg) flush.

TERMINALS: Front connected screw type.

(continued)

MODEL 534 (continued)

ZERO CENTER TYPES					
D-C Range	Resistance Ohms ±20%	Accuracy % of Span	Recommended Volts on Contacts	D-C Contact Load ma	CATNO
7.5-0-7.5 μa	4,100	5	6	35	534-1403001
25-0-25 μa	1,100	5	6	35	—
50-0-50 μa	1,100	2	6	35-200	—
100-0-100 μa	1,100	2	6	35-200	—
200-0-200 μa	690	2	6	35-200	—
500-0-500 μa	50	2	6	35-200	—
1-0-1 ma	25	2	6	35-200	—
5-0-5 ma	3	2	6	35-200	
1-0-1 v	3,275	2	6	35-200	—
5-0-5 v	15.275	2	6	35-200	—
10-0-10 v	30,275	2	6	35-200	—
1-0-1 mv	0.9*	5	6	35	—
5-0-5 mv	0.9*	5	6	35	—
10-0-10 mv	1.8	2	6	35-200	
50-0-50 mv	9.0	2	6	35-200	-
100-0-100 mv	18.0	2	6	35-200	—

*Resistance not temperature compensated

SUPPRESSED ZERO TYPE			
D-C Range	Resistance Ohms ±20%	Accuracy††	CATNO
7.5-15 μa†	4,100	± 1.25 μa	534-2403001
15-30 μa†	1,100	± 2.5 μa	534-2402001s
100-200 μa	1,100	±12.5 μa	—
500-550 μa	1,100	±12.5 μa	—
450-850 μa	690	±20 μa	—
200-800 μa	275	±20 μa	—
1-2 ma	50	± 0.07 ma	
5-7 ma	25	± 0.15 ma	—
40-42 v	5025(±5%)	± 0.25 v	—
1-2 mv†	0.9**	± 0.1 mv	—
5-10 mv	0.9**	± 0.4 mv	—
10-20 mv	1.8	± 0.8 mv	—
100-200 mv	1.8	± 8.0 mv	—

††Repeatability will be well within accuracy limits.

†Contact load on these ranges is 6 volts, 35 ma d-c; all other ranges 6 volts at 35-200 ma d-c.
**Resistance is not temperature compensated.

MODEL 730

GENERAL: Model 730 is a sensitive indicating relay which eliminates the need for a separate milliammeter in the circuit. Designed for operation when normally flowing current either increases or decreases beyond a predetermined value. It is generally used in closed alarm systems such as banks, fire and police alarm circuits. Model 730 can be engineered to meet the specific requirements of a particular application.

RANGES: As high as ½ amp self-contained, higher current ranges available through use of appropriate 100 mv shunt. Voltage ranges from as low as 100 mv to as high as 150 volts can be supplied self-contained; higher ranges available through use of external resistance.

ACCURACY: ±5% of full scale value.

SCALE: The normal scale angle is 40° (.92″).

CONTACTS: Single or double fixed contacts. Recommended contact load is 6 volts at 35 ma d-c. The contact circuit is insulated from the moving coil circuit. On those applications wherein a high and low contact is desired, the lower contact will be set 10% up scale for current pull-in. It cannot be set at the zero mark since no pull-in torque exists at this point.

ZERO SUPPRESSION: 5 scale lengths maximum.

CASE STYLE: Flush type is standard. Surface case available. The front cover can be removed from the case for adjustment of contacts or zero correction without removing the relay from the panel.

MOUNTING: Vertical panel mounting is standard.

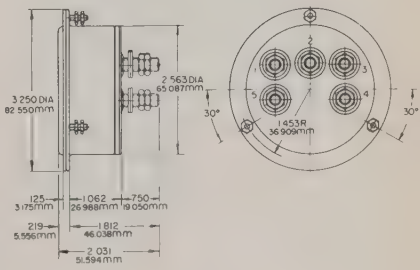
RESISTANCE: See Range listing.

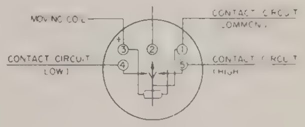
DIELECTRIC: 500 volts rms between circuits (test). 500 volts rms between case and all circuits tied together (test).

APPROX. WEIGHT: 0.85 lbs. (0.39 kg)

TERMINALS: BC studs.

MILLIAMPS
0
1
2
3
4
WESTON
RELAY


3 250 DIA
82 550mm
2 563 DIA
65 087mm
125
3.175mm
1 062
26 988mm
750
19 050mm
219
5.556mm
1 812
46.038mm
2 031
51.594mm
1
2
3
4
5
30°
30°
1 453R
36 909mm


MOVING COIL
+
CONTACT CIRCUIT (COMMON)
CONTACT CIRCUIT (LOW)
CONTACT CIRCUIT (HIGH)
1
2
3
4
5

Front View

RANGES				
D-C Range	Resistance Ohms ± 20%	CATNO Double Contact		CATNO Double Contact
0-200 μa	7,400	—		
0-250 μa	2,650	-		
0-500 μa	—			
0-1 ma	—	—		
0-1.5 ma	400	-		
0-4 ma	60	730-9101001		730-9201001
0-2 v	1,000 Ω/v			
0-10 v	1,000 Ω/v			
0-100 v	1,000 Ω/v			
0-150 v	1,000 Ω/v			
0-100 mv	1,000 Ω/v	—		

*Above prices are for single or double contacts.

s Normally carried in stock.

miniature sensitive relay

MODEL 813

GENERAL: The miniature Model 813, modern and compact, provides many advantages of other relays, with added versatility and ruggedness. With the addition of spring-back jewels it is more reliable than ever and its small size, light weight and tested sturdiness make this relay adaptable for airborne, marine, and portable uses as well as switchboard applications.

This relay is not intended for precise alarm or control applications, but is designed for a triggering alarm or control wherein the moving coil current changes quickly in order that the contacts close with a sharp impact. It is not recommended for a-c operation.

RANGES: See listing.

ACCURACY: ±10% of span.

SCALE: None.

CONTACTS: Sensitive type can handle contact load of 35 milliamperes at 6 volts d-c. Contacts have rare metal surfaces and are non-magnetic and self-resetting.

ZERO SUPPRESSION: Approximately 10 to 15 times depending upon contact setting.

CASE STYLE: Base is thermosetting plastic and cover is transparent plastic.

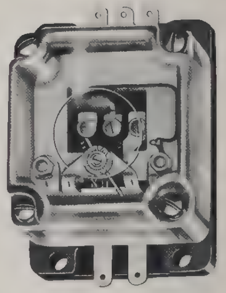
MOUNTING: Vertical panel mounting, surface type, front connected.

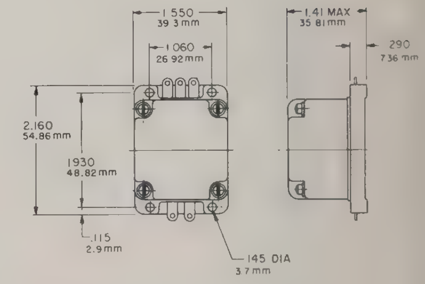
RESISTANCE: See Range listing.

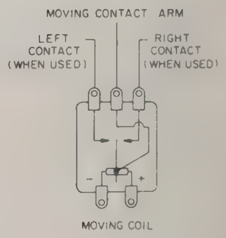
DIELECTRIC: 500 rms between circuits (test).

APPROX. WEIGHT: 3.5 oz. (0.10 kg)

TERMINALS: Solder type.







Front View

RANGES

D-C Range	Resistance Ohms ±20%	CATNO
25-0-25 μa	3,150	—
50-0-50 μa	1,000	813-9968001
100-0-100 μa	555	—
200-0-200 μa	140	—
500-0-500 μa	65	—
1-0-1 ma	12	—
2-0-2 ma	7.5	—
5-0-5 ma	3.2	
10-0-10 ma	2.1	-
20-0-20 ma	2.1	-
1-0-1 v	1,000 Ω/v	-
25-0-25 v	1,000 Ω/v	
50-0-50 v	1,000 Ω v	-
100-0-100 v	1,000 Ω/v	-
50-0-50 mv	500 Ω v	-
100-0-100 mv	1,000 Ω v	-

s–Normally carried in stock.

All dimensional diagrams approximate.

miniature sensitive hermetically sealed relay

MODEL 1081

GENERAL: Model 1081 relay is ideal for applications where weight and small size are important, or where external electro-magnetic effects must be held to a minimum.

RANGES: See listing. Others available.

ACCURACY: ±10% of span.

SCALE: None.

CONTACTS: Double contacts with capacity of 35 milliamperes at 6 volts d-c non-inductive at high sensitivity; loads up to 0.5 amperes at 28 volts d-c, non-inductive can be handled depending upon moving coil sensitivity and number of operations.

ZERO SUPPRESSION: Approximately two (2) scale lengths, depending on range.

CASE STYLE: Housed in a brass, tinned finished case. "Mu-metal" cases for maximum shielding can be supplied; unless otherwise specified surface, brass cases will be supplied.

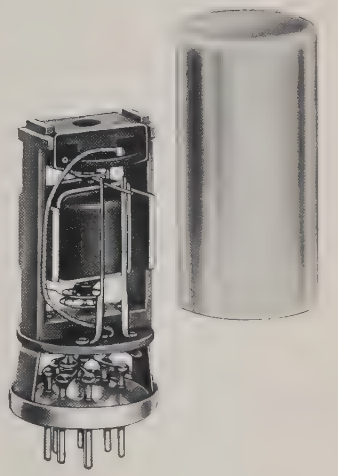
MOUNTING: Upright mounting is standard. (Base horizontal.)

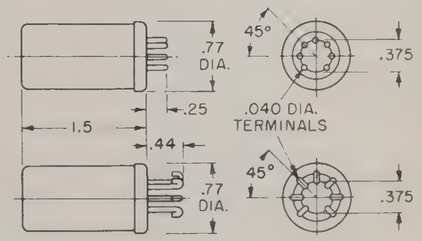
RESISTANCE: See Range listing.

DIELECTRIC: 350 volts rms between all circuits tied together and case; and between the moving coil circuit tied together and the contact circuits (test).

APPROX. WEIGHT: 1.1 oz.

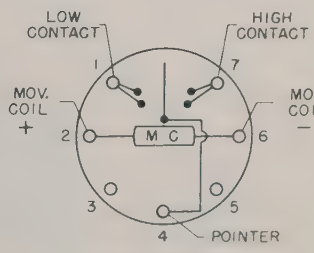
TERMINALS: Miniature 7 pin header, or hooked solder type terminals.





RANGES			
D-C Range	Resistance Ohms ±20%	CATNO	Terminal Type
50-0-50 μa	2,300	1081-9902001s	Contact Pin
50-0-50 μa	2,300	1081-9902002s	Solder Term.
1-0-1 ma	50	—	Either Type
5-0-5 ma	6	—	Either Type

s–Normally carried in stock.



VIEW FROM TOP

All dimensional diagrams approximate.

sensitrol relays

MODEL 705

GENERAL: These relays are highly sensitive to the most minute changes in current or voltage and have remarkably high contact capacity. The Model 705 is ideal for countless applications requiring reliable electrical response to initiate alarms or to achieve ultra-sensitive control. Positive and accurate operation can be obtained as low as five microamperes with a 2300 ohm moving coil. For even greater sensitivity, Type N is recommended with ranges as low as ½-0-½ microampere at 7400 ohms.

These relays can be supplied with various contact arrangements to operate on either increasing or decreasing values.

RANGES: See listing.

ACCURACY: ±5% of scale span for Types 1, 2 and 3; ±10% for Types 4, 5, 6 and N.

SCALE: See "Description of Types."

CONTACTS: Single, double, adjustable and fixed (see "Description of Types"). Contact capacity of Types 1, 2, and 3 is 50 ma at 120 volts a-c or d-c. Types 4, 5, 6 and N which use the TWINTACTS® contact system are rated at 100 ma at 120 volts a-c or d-c.

ZERO SUPPRESSION: Zero can generally be suppressed four to ten scale lengths, depending on deflection angle.

CASE STYLE: Phenolic or metal. Surface (metal) will be provided unless otherwise specified on order.

MOUNTING: Flush or surface, vertical panel mounting.

RESISTANCE: See Range listing.

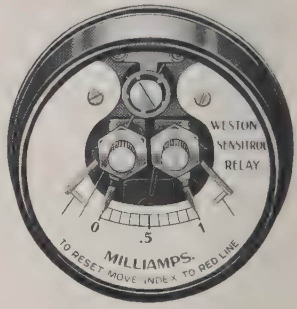
DIELECTRIC: 500 volts rms between all circuits and between terminals and case (test).

APPROX. WEIGHTS: Type 1, 0.74 lb. (0,34 kg); Type 2, 0.73 lb. (0.33 kg); Type 3, 0.73 lb. (0.33 kg); Type 4, 0.85 lb. (0.39 kg); Type 5, 0.85 lb. (0.39 kg); Type 6, (Flush) 0.7 lb. (0.32 kg); Type 6 (Surface) 0.7 lb. (0.32 kg) exclusive of 1.6 oz. (0.05 kg) solenoid; Type N, 1.3 lb. (0.59 kg).

TERMINALS: B.C. Studs, except Type N.

WESTON
SENSITROL
RELAY
0
5
10
MICROAMPS.
POINTER NORMALLY TO RIGHT OF RED LINE

Type 1


WESTON
SENSITROL
RELAY
0
.5
1
MILLIAMPS.
TO RESET MOVE INDEX TO RED LINE

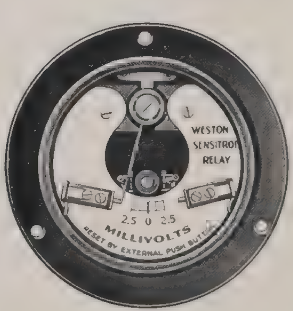
Type 3

WESTON
SENSITROL
RELAY
0
50
100
MICROAMPS D.C.

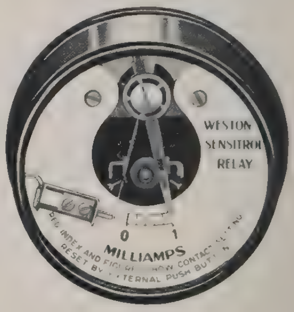
Type 3S

MOD 705
TYPE-N
5 0 5
MICROAMPERES
WESTON
SENSITROL RELAY

Type N


WESTON
SENSITROL
RELAY
2.5 0 2.5
MILLIVOLTS
RESET BY EXTERNAL PUSH BUTTON

Type 6


WESTON
SENSITROL
RELAY
0
1
MILLIAMPS

Type 5

DESCRIPTION OF TYPES

Type 1 — Single Fixed Contact with Manual Reset. Stationary contact remains in fixed position on left side of scale. Supplied to make contact on either increasing or decreasing values (state which). Reset manually by a knob on the front or a lever on the back. Scale length approximately 30° or .6 inch. Minimum current for full scale deflection is 10 microamperes.

Type 2 — Single Adjustable Contact with Manual Reset. Stationary contact can be adjusted over half of scale by means of knob on front which is also the reset control. Supplied to make contact on either increasing or decreasing values, (state which). Provided with a movable index to show the operating point. Scale length approximately 50° or 1 inch. Minimum current for full scale deflection 10 microamperes.

Type 2S — Same as Type 2 except with separate contact adjusting and reset controls. This relay may be reset without disturbing the operating point of the relay. Scale length is approximately 38°.

Type 3 — Double Adjustable Contacts with Manual Reset. Has two adjustable stationary contacts, one for high and one for low values. Provided with two indexes for indicating high and low operating points. Contacts adjusted and reset by knobs on front. Closest that contacts can be set together is 30% of scale length. Scale length approximately 50° or 1 inch. Minimum current for full scale deflection is 10 microamperes.

Type 3S — Same as Type 3 except with separate contact adjusting and reset controls. This relay may be reset without disturbing either high or low operating point. Scale length is approximately 38°.

Type 4 — Single Fixed Contact with Solenoid Reset. Uses TWINTACTS® contact system. Supplied to make contact on either increasing or decreasing values (state which). Scale length approximately 20° or .4 inch. Minimum current for full scale deflection is 5 microamperes.

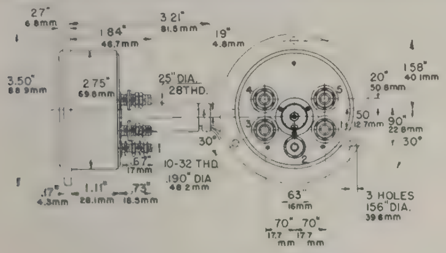
Type 5 — Single Contact with Solenoid Reset and Adjustable Operating Point. Similar to Type 4 but contact making value is adjustable over the full scale by means of an adjustable index which shifts the control spring similar to the action of a zero corrector. Because of this type of adjustment, the pointer is not necessarily a direct indication of the coil current. Has two scales, a red one for setting the index to the value at which contact is to be made, and a black scale which indicates the change in coil current or voltage necessary to achieve the contact making value. The stationary contact is always on the left side of the scale, but can be supplied to make contact on either increasing or decreasing values (state which). Scale length approximately 20° or .4 inch. Minimum current for full scale deflection is 5 microamperes.

Type 6 — Double Fixed Contact with Solenoid Reset. Uses Twintacts. Makes contact on both increasing and decreasing values. Scale length 15° or .3 inch. Minimum current for full scale deflection is 5 microamperes.

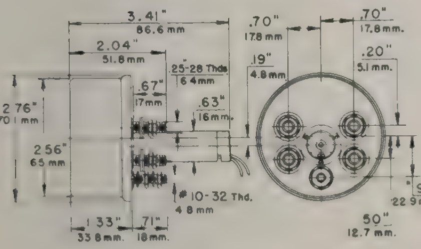
Type N — Double Contact with Solenoid Reset. Has TWINTACTS® contact system at each end of scale for increasing and decreasing values. Designed for applications calling for maximum sensitivity. Slightly larger than other Model 705 Relays, Type N is supplied in surface metal case only. Scale length 15° or .3 inch. Minimum current for full scale deflection is 1 microampere.

NOTE: Model 705 Solenoids are mounted permanently on back of relay, extending about 2″ and are available for 6 volts d-c or 120 volts 60 cycle a-c service, but can be supplied for other d-c or a-c service at a surcharge.

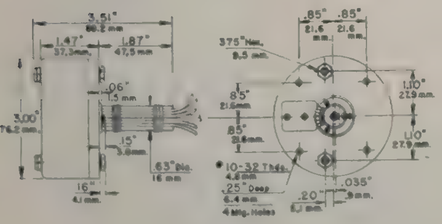
When ordering Model 705 Relays, use type numbers printed above and when zero left or suppressed zero, specify whether contacts are to close on increasing or decreasing values or both. Note that if zero center, contact is made on increasing values in each direction.


.27" 6.8mm
1.84" 46.7mm
3.21" 81.5mm
.19" 4.8mm
3.50" 88.9mm
2.75" 69.8mm
.25" DIA. 28THD.
.67" 17mm
10-32 THD
.190" DIA 48.2mm
.17" 4.3mm
1.11" 28.1mm
.73" 18.5mm
30°
4
5
3
2
1.58" 40.1mm
.20" 50.8mm
.50 12.7mm
.90" 22.8mm
30°
.63" 16mm
.70" .70" 17.7 mm 17.7 mm
3 HOLES .156" DIA. 39.6mm

Type 6 *— Flush Case.

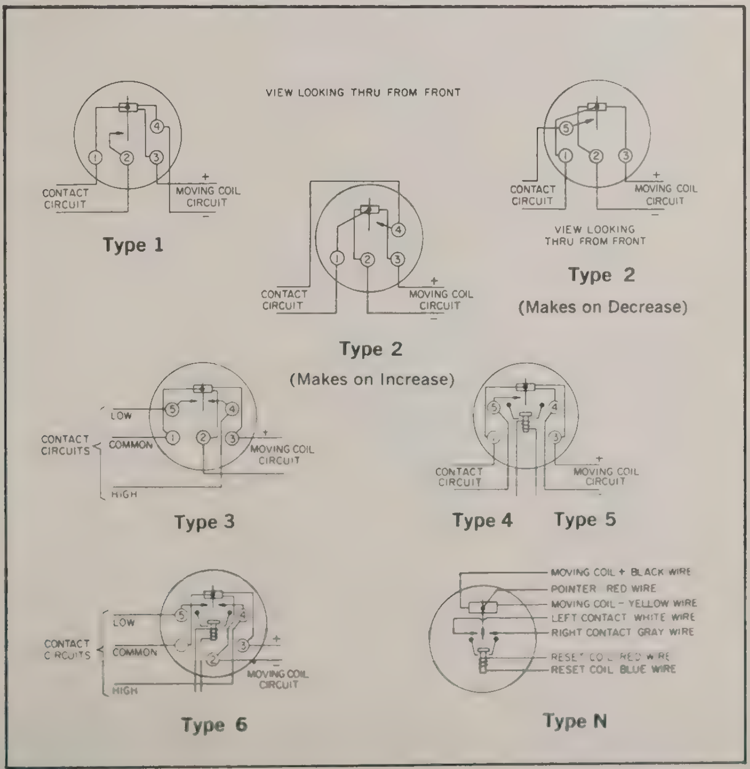

3.41" 86.6 mm
2.04" 51.8mm
.70" 17.8 mm
.70" 17.8mm.
.19" 4.8mm
.20" 5.1mm.
.25-28 Thds 6.4mm
.67" 17mm
.63" 16mm.
2.76" 70.1 mm
2.56" 65 mm
# 10-32 Thd. 4.8 mm
.90" 22.9mm.
1.33" 33.8mm.
.71" 18mm.
.50" 12.7 mm.

Type 6 *— Surface Case


3.51" 89.2 mm
1.47" 37.3mm.
1.87" 47.5mm
.06" 1.5 mm
3.00" 76.2mm.
.15" 3.8mm.
.63" Dia. 16 mm
.16" 4.1mm.
.375" Hex. 9.5 mm.
.85" .85" 21.6 mm. 21.6 mm.
.85" 21.6mm
.85" 21.6mm.
1.10" 27.9mm.
1.10" 27.9mm.
● 10-32 Thds. 4.8mm .25" Deep 6.4 mm 4 Mtg. Holes
.035" .9mm.
.20" 5.1 mm.

Type N

*Dimensions are also approximate for Types 1, 2, 3, 4 and 5.


VIEW LOOKING THRU FROM FRONT
CONTACT CIRCUIT
MOVING COIL CIRCUIT
Type 1
CONTACT CIRCUIT
MOVING COIL CIRCUIT
Type 2
(Makes on Increase)
CONTACT CIRCUIT
MOVING COIL CIRCUIT
VIEW LOOKING THRU FROM FRONT
Type 2
(Makes on Decrease)
CONTACT CIRCUITS
LOW
COMMON
HIGH
MOVING COIL CIRCUIT
Type 3
CONTACT CIRCUIT
MOVING COIL CIRCUIT
Type 4
Type 5
CONTACT CIRCUITS
LOW
COMMON
HIGH
MOVING COIL CIRCUIT
Type 6
MOVING COIL + BLACK WIRE
POINTER RED WIRE
MOVING COIL - YELLOW WIRE
LEFT CONTACT WHITE WIRE
RIGHT CONTACT GRAY WIRE
RESET COIL RED WIRE
RESET COIL BLUE WIRE
Type N

(continued)

All dimensional diagrams approximate.

MODEL 705 (continued)

TYPE 1 — Single Fixed Contact — Manual Reset

D-C Range	Resistance Ohms ±20%
0-10 µa	2,300
0-20 µa	2,300
0-30 µa	2,300
0-40 µa	1,040
0-50 µa	525
0-80 µa	60
0-100 µa	60
0-150 µa	60
0-200 µa	13
0-300 µa	13
0-500 µa	13
0-1 ma	10
0-50 mv	1,000 Ω/v
0-1 v	1,000 Ω/v
0-100 v	1,000 Ω/v

TYPE 2 — Single Adjustable Contact — Manual Reset

D-C Range	Resistance Ohms ±20%
0-10 µa	2,300
0-20 µa	2,300
0-30 µa	2,300
0-40 µa	1,040
0-50 µa	525
0-80 µa	525
0-100 µa	525
0-150 µa	60
0-200 µa	13
0-300 µa	13
0-500 µa	13
0-1 ma	10
0-50 mv	1,000 Ω/v
0-1 v	1,000 Ω/v
0-100 v	1,000 Ω/v

TYPE 2S — Same as Type 2 Except with Separate Contact Adjusting & Reset Controls

D-C Range	Resistance Ohms ±20%
0-10 µa	2,300
0-20 µa	2,300
0-30 µa	2,300
0-40 µa	1,040
0-50 µa	525
0-80 µa	525
0-100 µa	525
0-150 µa	60
0-200 µa	60
0-300 µa	13
0-500 µa	13
0-1 ma	10
0-50 mv	180
0-1 v	1,000 Ω/v
0-100 v	1,000 Ω/v

TYPE 3 — Double Adjustable Contacts — Manual Resets

D-C Range	Resistance Ohms ±20%
0-10 µa	2,300
0-20 µa	2,300
0-30 µa	2,300
0-40 µa	1,040
0-50 µa	525
0-80 µa	525
0-100 µa	525
0-150 µa	60
0-200 µa	60
0-300 µa	13
0-500 µa	13
0-1 ma	10
0-50 mv	1,000 Ω/v
0-1 v	1,000 Ω/v
0-100 v	1,000 Ω/v

*TYPE 3S — Double Adjustable Contacts — Manual Reset

D-C Range	Resistance Ohms ±20%
0-10 µa	2,300
0-20 µa	2,300
0-30 µa	2,300
0-40 µa	1,040
0-50 µa	525
0-80 µa	525
0-100 µa	525
0-150 µa	60
0-200 µa	60
0-300 µa	13
0-500 µa	13
0-1 ma	10
0-50 mv	1,000 Ω/v
0-100 v	1,000 Ω/v

*Has separate contact and adjustable reset controls.
Note: All resistance values are approximate.

TYPE 4 — Single Contact Solenoid Reset

D-C Range	Resistance Ohms ±20%
0-5 μa	2,300
0-10 μa	2,300
0-20 μa	525
0-30 μa	525
0-40 μa	525
0-50 μa	60
0-80 μa	60
0-100 μa	60
0-150 μa	13
0-200 μa	13
0-300 μa	13
0-500 μa	13
0-1 ma	10
0-50 mv	1,000 Ω/v
0-1 v	1,000 Ω/v
0-100 v	1,000 Ω/v

TYPE 5 — Single Contact Solenoid Reset and Adjustable Operating Point

D-C Range	Resistance Ohms ±20%
0-5 μa	2,300
0-10 μa	2,300
0-20 μa	525
0-30 μa	525
0-40 μa	525
0-50 μa	60
0-80 μa	60
0-100 μa	60
0-150 μa	13
0-200 μa	13
0-300 μa	13
0-500 μa	13
0-1 ma	10
0-50 mv	1,000 Ω/v
0-1 v	1,000 Ω/v
0-100 v	1,000 Ω/v

TYPE 6 — Double Contact Solenoid Reset

D-C Range	Resistance Ohms ±20%
0-5 μa	2,300
0-10 μa	2,300
0-20 μa	525
0-30 μa	525
0-40 μa	60
0-50 μa	60
0-80 μa	60
0-100 μa	13
0-150 μa	13
0-200 μa	13
0-300 μa	13
0-500 μa	13
0-1 ma	10
0-50 mv	1,000 Ω/v
0-1 v	1,000 Ω/v
0-100 v	1,000 Ω/v

TYPE N — Double Contact with Solenoid Reset

Reset is 6 volt d-c or 120 volt a-c

D-C Range	Resistance Ohms ±20%
1-0-1 μa	2,300

Note: All resistance values are approximate.

A-C RELAYS

Ranges	Type 1	Type 2	Type 2-S	Type 3	Type 3-S	Type 4*	Type 5*	Type 6*
10 microamperes up to 10 milliamperes								
0.5 volt up to 150 volts								

External box containing rectifier or resistance and rectifier supplied with all a-c relays.

Temperature Relays

Ranges	Type 1	Type 2	Type 2-S	Type 3	Type 3-S	Type 4*	Type 5*	Type 6*
State range required in °F. or °C., cold end temperature, resistance and material of couple, and leads to be used with the relay								

Adjusted for use with the following and other standard thermocouples: Iron-Constantan, Copper-Constantan, Chromel-Copel, Chromel-Alumel and Platinum 10% Rhodium. (Thermocouples not supplied.) For automatic cold end compensation add list.

* **6 volt d-c or 120 volt a-c solenoid is standard. Special voltage solenoids available.**

sealed sensitrol® relay

MODEL 723

GENERAL: Model 723 is a sealed SENSITROL® type relay incorporating a self-shielded core magnet mechanism and built-in electrical reset device. Standard reset voltage is 6 volts d-c or 120 volts a-c. Reset time is ⅛ second maximum at rated voltage. Other special reset voltages are available at a surcharge.

RANGES: See listing.

ACCURACY: ± 5% of span.

SCALE: Standard angle is 25° for single contact; for double contact angle is 18°.

CONTACTS-TWINTACTS® (pairs of adjacent parallel magnetic contacts): contact capacity is 100 milliamperes at 115 volts a-c or d-c.

ZERO SUPPRESSION: 4 to 10 scale lengths, depending on range.

CASE STYLE: Flush, metal.

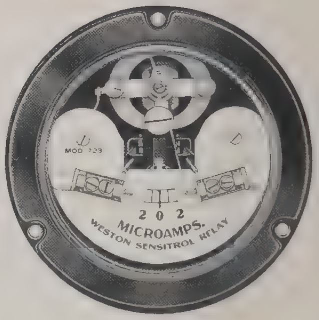
MOUNTING: Vertical panel mounting is standard.

RESISTANCE: See Range listing.

DIELECTRIC: Between circuits 500 volts rms. All terminals tied together to case 1000 volts rms. At a surcharge, 1750 volts rms can be provided.

APPROX. WEIGHT: 10.5 ozs.

TERMINALS: Solder type.


MOD 723
2 0 2
MICROAMPS.
WESTON SENSITROL RELAY

SINGLE CONTACT TYPE

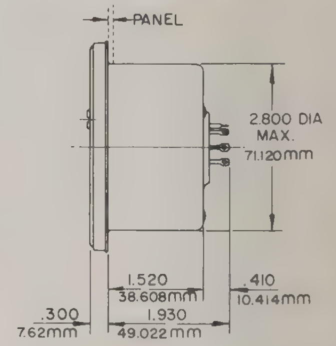
D-C Range	Resistance Ohms ±20%
0-1 μa*	10,400
0-2 μa	4,100
0-5 μa	2,900
0-10 μa	2,900
0-20 μa	450
0-50 μa	125
0-100 μa	31
0-500 μa	9
0-1 ma	2.2
0-2 ma	2.0
0-5 ma	2.0
0-1 v	1,000 Ω/v
0-100 v	1,000 Ω/v
0-5 mv	1,000 Ω/v
0-10 mv	1,000 Ω/v
0-50 mv	1,000 Ω/v.

*The 0-1 μa range for use in horizontal position only; scale angle is 16°.

DOUBLE CONTACT TYPE

D-C Range	Resistance Ohms ±20%
0.5-0-0.5 μa*†	10,400
1-0-1 μa*	4,100
2-0-2 μa*	4,100
5-0-5 μa	2,900
10-0-10 μa	450
20-0-20 μa	115
50-0-50 μa	31
100-0-100 μa	8.1
500-0-500 μa	2.2
1-0-1 ma	2.0
2-0-2 ma	2.0
5-0-5 ma	2.0
2-0-2 mv	2,000 Ω/v
5-0-5 mv	1,000 Ω/v
50-0-50 mv	1,000 Ω/v
1-0-1 v	1,000 Ω/v
100-0-100 v	1,000 Ω/v

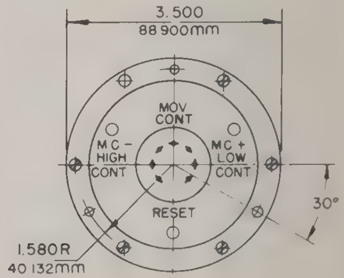
*Ranges below 2-0-2 μa, for use in horizontal position only.
†Scale is 16°.

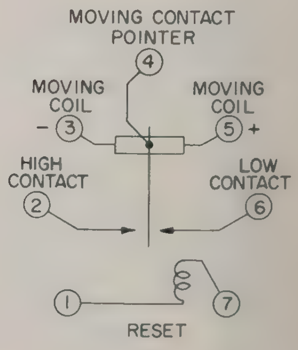

PANEL
2.800 DIA MAX.
71.120mm
1.520
38.608mm
.410
10.414mm
1.930
49.022mm
.300
7.62mm

A-C RANGES	SINGLE CONTACT	DOUBLE CONTACT
5 mics up to 10 ma, a-c		
½ volt up to 100 volts a-c		
100 volts a-c up to 500 volts a-c		
** F or C		

**State range required, cold end temperature, resistance, and material of thermocouple and leads to be used with the relay.

The model 723 is supplied with a 6 volt D-C, or 120 volts A-C solenoid reset as standard.


3.500
88.900mm
MOV CONT
MC − HIGH CONT
MC + LOW CONT
RESET
30°
1.580R
40.132mm


MOVING CONTACT POINTER
4
MOVING COIL
− 3
MOVING COIL
5 +
HIGH CONTACT
2
LOW CONTACT
6
1
7
RESET

View from Back

All dimensional diagrams approximate.

miniature sensitrol® relay

MODEL 813

GENERAL: The miniature Model 813, modern and compact, provides many advantages of other relays, with added versatility and ruggedness. With the addition of spring-back jewels it is more reliable than ever and its small size, light weight and tested sturdiness make this relay adaptable for airborne, marine, and portable uses as well as switchboard applications.

RANGES: The ranges shown in the listing are self-contained. Contact the factory for extension of current or voltage ranges since external resistors or shunts may be required. External rectifiers can be supplied for high-level a-c voltage operation, and internal rectification is available for low level applications.

ACCURACY: 10% of span.

SCALE: Angle is 15° (0.3").

CONTACTS: Contact capacity is 100 milliamperes at 115 volts either a-c or d-c. A magnetic tip on the pointer is the moving contact. It is supplied with one or two permanently magnetized stationary contact assemblies at one or both ends of the indicating scale.

Configurations available: Single magnetic contact with manual push-button or solenoid reset; double magnetic contact with manual or solenoid reset.

ZERO SUPPRESSION: Approximately 10 scale lengths depending upon contact setting.

CASE STYLE: Base is thermosetting plastic, and cover is transparent plastic. Zero corrector can be supplied.

MOUNTING: Surface type, front connected; unless otherwise specified, Model 813 is adjusted for vertical mounting.

RESISTANCE: See Range listing.

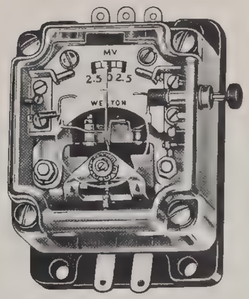
DIELECTRIC: Single and double contact—500 volts rms between moving coil circuit and contact circuit (test).

SOLENOID RESETS: Standard solenoid is intended for intermittent energization:

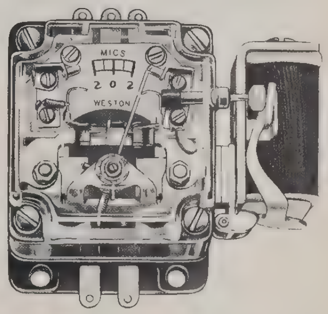
Voltage	Resis. ±20%	Voltage	Resis. ±20%
6 volts d-c	10 ohms	24 volts d-c	140 ohms
12 volts d-c	36 ohms	115 volts a-c	1,070 ohms

APPROX. WEIGHT: 5 oz. (0.14 kg.).

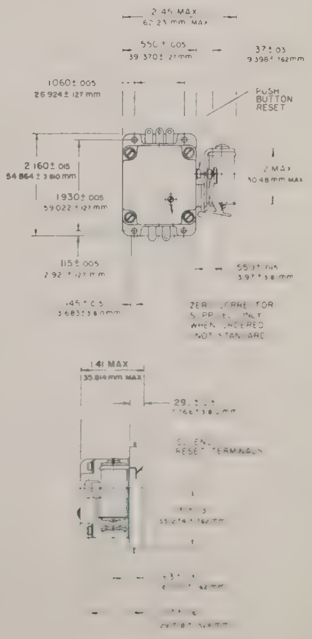
TERMINALS: Solder type.

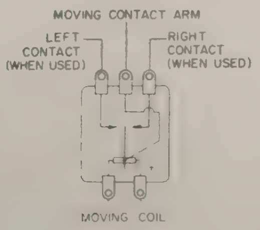

MV
2.5 0 2.5
WESTON

Double Contacts with Push-Button.


MICS
2 0 2
WESTON

Double Contacts with Solenoid.


2.45 MAX
62.23 mm MAX
1.550 ± .005
39.370 ± .127 mm
.37 ± .03
9.398 ± .762 mm
1.060 ± .005
26.924 ± .127 mm
PUSH BUTTON RESET
2.160 ± .015
54.864 ± .3810 mm
1.930 ± .005
59.022 ± .127 mm
2 MAX
50.48 mm MAX
.115 ± .005
2.92 ± .127 mm
.145 ± .015
3.683 ± .38 mm
ZERO CORRECTOR SUPPLIED ONLY WHEN ORDERED NOT STANDARD
1.41 MAX
35.814 mm MAX
SOLENOID RESET TERMINALS


MOVING CONTACT ARM
LEFT CONTACT (WHEN USED)
RIGHT CONTACT (WHEN USED)
MOVING COIL

All dimensional diagrams approximate.

Front View

(continued)

MODEL 813 (continued)

SINGLE CONTACT TYPE			
D-C Range	Resistance Ohms ±20%	CATNO	CATNO
0-5 μa	3,150	813-9901001**	813-9903001**
0-10 μa	3,150	—	813-9903002**
0-50 μa	140	—	—
0-100 μa	43	—	—
0-200 μa	14	—	—
0-500 μa	5.6	—	—
0-1 ma	2.6	—	—
0-2 ma	2.1	—	—
0-5 ma	2.1	—	—
0-10 ma	2.1	—	—
0-1 v	1,000 Ω/v	—	—
0-100 v	1,000 Ω/v	—	—
0-10 mv	—	—	—
0-50 mv	—	—	—

DOUBLE CONTACT TYPE			
D-C Range	Resistance Ohms ±20%	CATNO	CATNO
2-0-2 μa	3,150	—	813-9967002**
5-0-5 μa	1,700	—	—
10-0-10 μa	1010	—	—
20-0-20 μa	140	—	—
50-0-50 μa	43		—
100-0-100 μa	14		—
500-0-500 μa	2.6	—	
1-0-1 ma	2.1	—	—
2-0-2 ma	2.1	—	—
5-0-5 ma	2.1	—	—
1-0-1 v	1,000 Ω/v		—
100-0-100 v	1,000 Ω/v		—
5-0-5 mv	—		
50-0-50 mv	—		

Zero corrector can be supplied
*For 6, 12, 24 volt DC or 115 volt AC
**115 v AC Solenoid Reset.

miniature sensitrol® relay

MODEL 1085

GENERAL: Model 1085 relay is a SENSITROL® type relay using magnetic contacts. It can be supplied as a single contact relay to make on increasing or decreasing current or with double contacts as a zero center relay. The semi-core magnet mechanism allows room for an electrical reset device to be mounted beneath the scale; thus, the complete relay and reset are enclosed in the high temperature resistant plastic case.

RANGE: See listing.

ACCURACY: ±10% of span value; repeatability is ±1%.

DEFLECTION: 20°-25° (0.3″).

CONTACTS: Contacts are rated at 100 milliamperes at 115 volts a-c or d-c. Double contact type is provided in zero center ranges with resistance as listed for a given sensitivity span.

SOLENOID RESET: Available in 6, 8, 12 or 24 volts d-c as standard for self-contained reset solenoid. Other voltages are available. 115 volts a-c supplied at $4.00 extra.

ZERO SUPPRESSION: Up to 5 times normal deflection (depending on range).

CASE STYLE: Base is thermosetting plastic, with cover of high temperature (80°C) molded plastic. Base-to-cover gasket provides a tight seal.

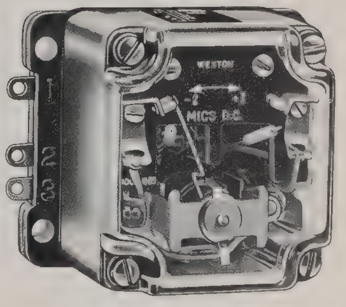
MOUNTING: Vertical is standard.

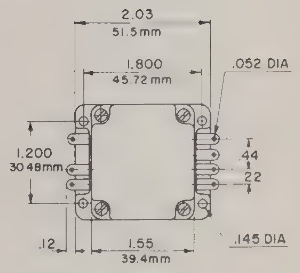
RESISTANCE: See Range listing.

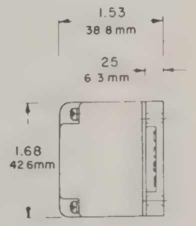
DIELECTRIC: 500 volts rms between circuits (test).

APPROX. WEIGHT: 14 oz.

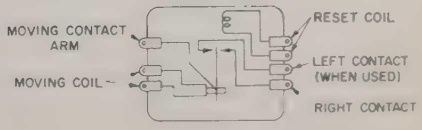
TERMINALS: Solder type terminals are molded in the base.




2.03
51.5 mm
1.800
45.72 mm
.052 DIA
1.200
30.48mm
.44
.22
.12
1.55
39.4mm
.145 DIA


1.53
38.8 mm
.25
6.3 mm
1.68
42.6mm

SINGLE and DOUBLE CONTACT TYPES	
D-C Range	Resistance Ohms ±20%
2-0-2 μa	3,000
0-10 μa	2,300
0-20 μa	1,700
0-50 μa	525
0-100 μa	68
0-200 μa	40
0-500 μa	20
0-1 ma	3.6
0-50 v	1,000 Ω/v
0-100 v	1,000 Ω/v

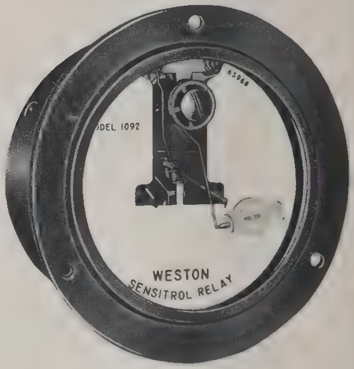

MOVING CONTACT ARM
MOVING COIL
RESET COIL
LEFT CONTACT (WHEN USED)
RIGHT CONTACT

Front View

All dimensional diagrams approximate.

all purpose sensitrol relay

MODEL 1092


MODEL 1092
WESTON
SENSITROL RELAY

GENERAL: Model 1092 is an all purpose SENSITROL® (magnetic contacts) relay at an unusually attractive price. This relay is available in a single adjustable range. It is the ideal relay for solving alarm or control problems, particularly in the development stage and its wide range of adjustment will permit an almost infinite number of accurately repeatable settings by the simple turn of one adjusting screw. Throttling action is provided by pulsing circuits which eliminate troublesome overshoot in many control applications. For "on-off" control, a simple setting can be made to hold such variables as temperature, voltage or light level constant within very narrow limits.

As a demonstration unit for classroom or commercial display work, its flexibility can't be matched. Two of these inexpensive SENSITROL® relays connected in opposition will provide close high-low control adjustability over a wide span by means of a simple screwdriver adjustment.

DUTY: Continuous.

SENSITIVITY: 0-50 μa, adjustable.

CONTACTS: Magnetic—100 ma at 115 v a-c or d-c.

DC MOVING COIL RESISTANCE: 2300 ohms±20%.

MOVING COIL POWER CONSUMPTION: .006 milliwatts @ 50 μa.

OVERLOAD: 500 microamperes.

RESPONSE TIME: 0.5 seconds approximately with 10% overload.

DIELECTRIC: 500 volts rms test between circuits and between terminals and case.

INSULATION: 100 megohms minimum at 100 volts d-c between circuits and between terminals and case.

RESET VOLTAGE: 115 volts a-c, continuous.

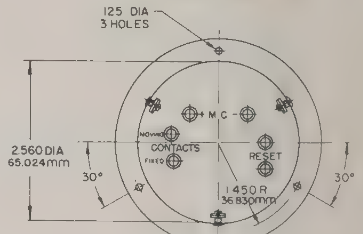
RESET COIL POWER: Approx. 1 watt at 115 volts a-c.

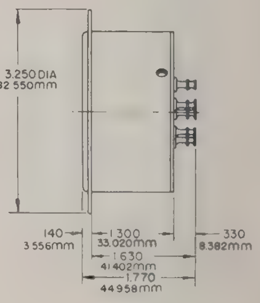
RESET TIME: ¼ second—max.

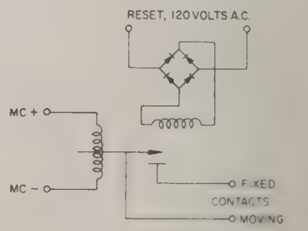
LIFE: 1,000,000 operations minimum.

APPROX. WEIGHT: 0.3 lb.

CATNO. 1092-9901001s


125 DIA
3 HOLES
2.560 DIA
65.024mm
M C
MOVING
CONTACTS
FIXED
RESET
30°
30°
1.450 R
36.830mm


3.250 DIA
82.550mm
140
3.556mm
1.300
33.020mm
1.630
41.402mm
1.770
44.958mm
330
8.382mm

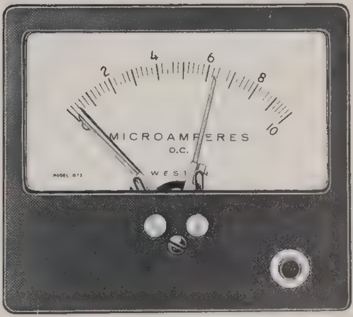

RESET, 120 VOLTS A.C.
MC +
MC −
FIXED
CONTACTS
MOVING

s–Normally carried in stock.

All dimensional diagrams approximate.

LCCA relays

MODEL 1073



GENERAL: This MagTrak® relay combines the high sensitivity of d-c permanent magnet indicating instruments, the reliability of magnetic contacts, and the locking and resetting features of the load current contact aiding type. Model 1073 features powerful initial contact pressure (100 times greater than most relays), fast make and break, single push button reset on front, set points readily adjustable and an auxiliary control package as a plug-in unit for remote mounting.

RANGES: See listing.

ACCURACY: (at normal room temperature) DC; 2% as indicator, 3% on contact (will normally repeat contact point at better than 1% if conditions are duplicated).

SCALE: 3.47″.

CONTACT ADJUSTMENT: Hand or screwdriver adjustable.

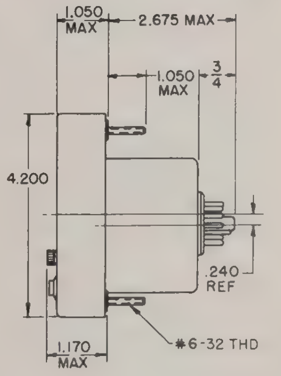
CONTACT ARRANGEMENT: High, low or both.

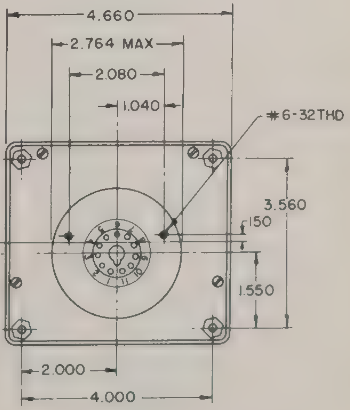
CONTACT RATING: 10 to 25 milliamperes at 6 to 150 volts d-c.

AIDING COIL RESISTANCE: Standard aiding coil resistance is 68 ohms. Standard units have contacts adjusted for 10 ma, at 24 volts dc for best accuracy; customers should specify contact current and source voltage.

CONTACT AIDING COIL ARRANGEMENTS:

1. Single aiding coil with one side common with sensing coil.
2. Single aiding coil completely isolated from sensing coil.
3. Two aiding coils, with one point common with both, but isolated from sensing coil.
4. Two aiding coils, with each coil common to sensing coil.





ISOLATION: Normally 70 volts d-c.

CASE STYLE: Black Bakelite front with glass window; cadmium plated steel case with screwdriver operated zero corrector.

MOUNTING: Vertical panel mounting is standard.

RESISTANCE: See Range listing.

DIELECTRIC: 3000 volts between all circuits tied together and case (test). 70 volts rms between individual circuits.

APPROX. WEIGHT: 1½ lbs.

TERMINALS: 11 pin plug connector mates with AMPHENOL* No. 78-S11 socket or equivalent.

---

*AMPHENOL®, Amphenol Corporation.

RANGES

For Rectifier Type A-C Insts. —

Range	Resistance — Ohms (±20%)	Single High Contact CATNO	DBL. High and Low Contacts Single Aiding Coil CATNO
0-10 μa	10,000	1073-5602010	1073-5601010
0-20 μa	10,000	—	—
0-50 μa	3,700	1073-5602050	1073-5601050s
0-100 μa	1,360	1073-5602100	1073-5601100s
0-200 μa	600	—	—
0-500 μa	120	1073-5602500	1073-5601500s
0-1 ma	35	1073-4602001s	1073-4601001s
0-5 ma	4	—	—
0-20 ma	1.05	1073-4602020	1073-4601020
0-1 amp	0.10	—	—
0-20 mv	20	—	—
0-50 mv	50	1073-9602050	1073-9601050s
0-100 mv	100	1073-9602100	1073-9601100
0-10 v	1,000 Ω/v	—	—
0-150 v	1,000 Ω/v	—	—

PYROMILLIVOLTMETERS

(With Cold End Compensation)*

Dual Scale			
Degrees F.	Degrees C.	Thermo-couple	DBL. High and Low Contacts Single Aiding Coil CATNO
0- 750	0- 400*	I/C	—
0-1000	0- 500*	I/C	1073-8601001
0-1500	0- 800*	I/C	—
0-2000	0-1100*	C/A	—
0-2500	0-1400	C/A	1073-8601002

All prices shown above are for instruments with number and type of contacts as indicated, single aiding coil, 70 volt isolation, and do not include the auxiliary control package. Surcharges for these features are shown below:

Feature

Additional Contact................................

Additional Aiding Coil....... . ...

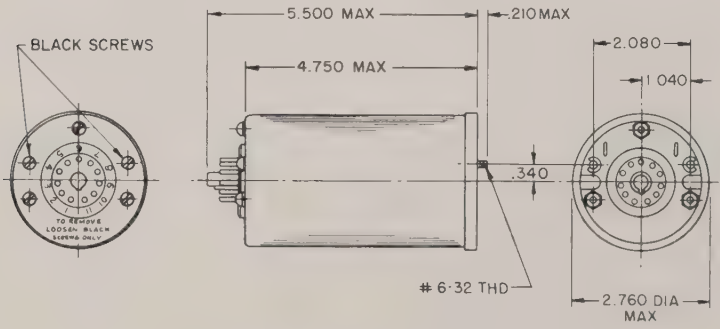
*Isolation between sensing coil and locking coil: above 70 volts to 200 volts, d-c continuous................

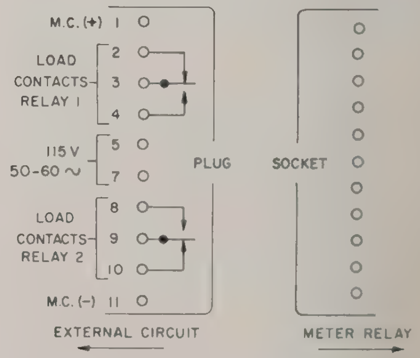
*Weston does not supply thermocouples. When thermocouples other than listed are used, specify type used. Lead resistance is calculated at 10 ohms. Customer must provide 10 ohms, or specify exact lead resistance on special order.

AUXILIARY CONTROL PACKAGE MODEL 9820

The Model 1073 MagTrak® relay offers as an optional feature a plug-in unit consisting of a solid-state rectifier and filter circuit to provide the necessary voltage for the contact aiding circuit. It also contains power relays with a contact current carrying capacity of 5 amperes at 220 volts to perform the switching operation for the actuating circuit. The Control Package may be plugged into the back of the relay or mounted remotely. Both the relay and Control Package are provided with eleven-pin plug connectors which accommodate commercially available sockets.

Control Package
(Model 9820) (CATNO 9900001s)





s–Normally carried in stock.

All dimensional diagrams approximate.

2½" sealed ruggedized relay

MODEL 1093

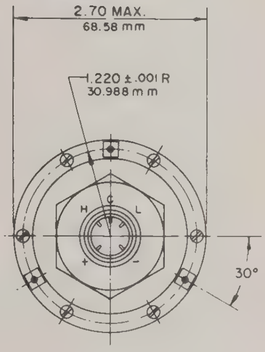
0
20
40
60
80
100
MICROAMPERES
D.C.
WESTON
MODEL 1093

GENERAL: This sealed, ruggedized LCCA instrument relay is particularly suited for alarm systems or for circuits with slowly changing inputs. Featuring a long scale and better dependability than non-locking types. This model meets the requirements of MIL-M-10304 as a meter only, with the following exceptions:

1. *Response time* (This will generally be slower than the mil spec requirement because meter-relays should be over-damped).
2. *Dielectric Test* = 1500 Volts, A.C. between all terminals tied together and the case and 70 Volts, A.C. between contact circuit and signal circuit.
3. *Random Drop* — This test is deleted.
4. *Shock* —Per MIL-STD-202, Method 202B *only*, with the following conditions: 50g's, with 10 blows in each of three positions.
5. *Initial Accuracy* — Per spec. as a meter; ± 3% of full scale contact accuracy.

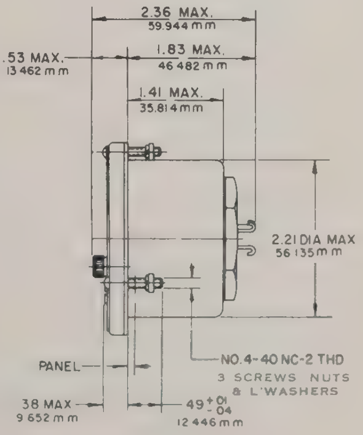
RANGES: See listing.

ACCURACY: ±2% of full scale readings as an indicator; ±3% of full scale on contact. Standard units have contacts adjusted for 10 ma, at 24 volts dc for best accuracy, customers should specify contact current and source voltage.


2.70 MAX.
68.58 mm
1.220 ± .001 R
30.988 mm
H
C
L
+
-
30°

SCALE: 100 degrees; approx. 1.8 inches; for ranges of 50 microamps and over. The 20μa range has an 86° scale angle (1.55").

CONTACTS: One or two independently adjustable (or pre-adjusted) contacts to close on increasing or decreasing current, rated at 5 to 25 ma at 24-125 volts d-c. Higher contact ratings (up to 300 ma) available on special order. Adjustable contacts have knurled and slotted adjusting knobs — suitable for hand or screwdriver adjustment.


2.36 MAX.
59.944 mm
.53 MAX.
13.462 mm
1.83 MAX.
46.482 mm
1.41 MAX.
35.814 mm
2.21 DIA MAX
56.135 mm
PANEL
NO. 4-40 NC-2 THD
3 SCREWS NUTS & L'WASHERS
.38 MAX
9.652 mm
.49 +.01 -.04
12.446 mm

CONTACT AIDING COIL ARRANGEMENTS:

Type 5 — single aiding coil, isolated from sensing coil.

Type 6 — two aiding coils, with one point common to both, but isolated from sensing coil.

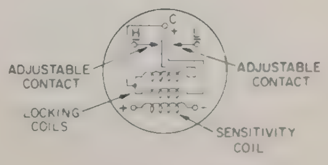
Type 6c — two aiding coils, with each coil common to sensing coil.

ZERO SUPPRESSION: one (1) to two (2) scale lengths, depending on range.

CASE STYLE: sealed round flush mounting, metal case with plastic window; sealed zero corrector, screwdriver operated.

MOUNTING: Vertical panel mounting is standard.

(continued)


H
C
L
+
-
ADJUSTABLE CONTACT
ADJUSTABLE CONTACT
LOCKING COILS
SENSITIVITY COIL

View from Back

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*Standard units have contacts adjusted for 10 ma at 24 volts d-c. For best accuracy on sensitive ranges, customers should specify contact current and source voltage.

MODEL 1093 (continued)

RESISTANCE: See Range listing.

ISOLATION: 70 volts d-c between circuits is standard (continuous).

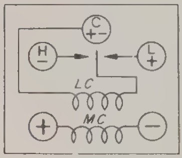
DIELECTRIC: 1500 volts d-c between all circuits tied together and case (test).

APPROX. WEIGHT: 10.5 oz.

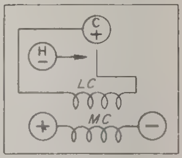
TERMINALS: All connections are made to a sealed header with solder type terminals.

INTERNAL WIRING DIAGRAMS

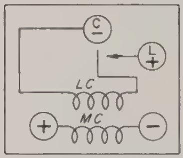
LC = locking coil *MC = moving coil*



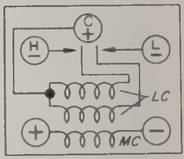
Type 5



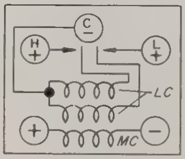
Type 5H



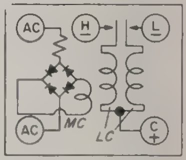
Type 5L



Type 6



Type 6A



Rectifier Type.

RANGES *	
D-C Range	Resistance Ohms ±20%
0-20 μa	4,650
0-50 μa	3,000
0-100 μa	3,000
0-200 μa	900
0-500 μa	110
0-1 ma	43
0-2 ma	22
0-20 ma	2.5
0-50 ma	2.0
0-100 ma	1.0
0-10 v	1,000 Ω/v
0-150 v	1,000 Ω/v
0-50 mv	15 Ω
0-100 mv	30 Ω

*Current ranges up to one (1) ampere will be provided self-contained at 100 mv drop.

**Prices shown are relays with single aiding coil, single adjustable contact and 70 volts isolation.

SURCHARGES

Additional Contact . . . .
Additional Locking Coil . . . .
Suppressed Zero . . . .
Rectifier Type . . . .
Isolation between sensing coil and locking coil:
above 70 volts to 200 volts, d-c continuous . . . .

3½″ sealed ruggedized relay

MODEL 1097

GENERAL: Model 1097 is a 3½″ round, sealed, ruggedized relay featuring the time tested reliability of the load current contact aiding (or locking) coil. Although similar to Model 1093, this relay has the advantage of longer scale length, improved readability and higher torque mechanism.

This model meets the requirements of MIL-M-10304 *as a meter only, with the following exceptions:*

1. *Response time* (This will generally be slower than the mil spec requirement because meter-relays should be over-damped).
2. *Dielectric Test* = 1500 Volts, A.C. between all terminals tied together and the case and 70 Volts, A.C. between contact circuit and signal circuit.
3. *Random Drop* — This test is deleted.
4. *Shock* — Per MIL-STD-202, Method 202B *only,* with the following conditions: 50g's, with 10 blows in each of three positions.
5. *Initial Accuracy* — Per spec. as a meter; ±3% of full scale contact accuracy.

RANGE: See listing.

ACCURACY: ±2% of full scale readings as an indicator; ±3% of full scale on contact. Standard units have contacts adjusted for 10 ma, at 24 volts dc for best accuracy, customers should specify contact current and source voltage.

SCALE: 95° — 2.27″ arc at pointer tip.

CONTACTS: One or two independently adjustable (or pre-adjusted) contacts to close on increasing or decreasing current, rated at 5 to 25 ma at 24-125 volts d-c. Higher contact ratings (up to 300 ma) available on special order. Adjustable contacts have knurled and slotted adjusting knobs — suitable for hand or screwdriver adjustment.

ZERO SUPPRESSION: Usually one to two scale lengths, depending upon range.

CASE STYLE: Sealed — 3.5″ diameter-round flush mounting, metal case with glass window. Zero corrector, screwdriver operated.

MOUNTING: Vertical panel mounting is standard.

RESISTANCE: See Range listing.

ISOLATION: 70 volts d-c between circuits is standard (continuous).

DIELECTRIC: 1500 volts rms between all terminals tied together and case (test).

APPROX. WEIGHT: 1.32 lbs. (.598 kgs).

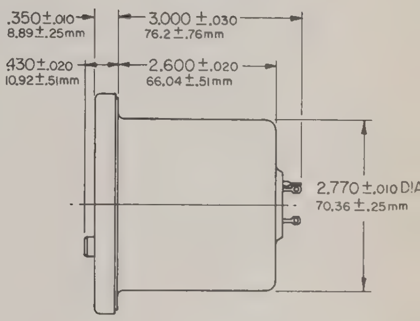
TERMINALS: All connections are made to a sealed header, with solder type terminals.

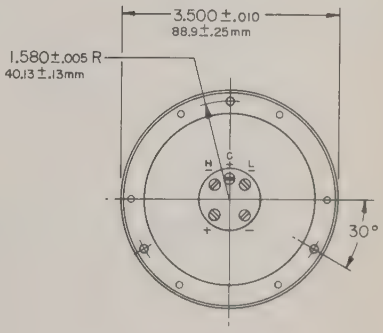
RANGES

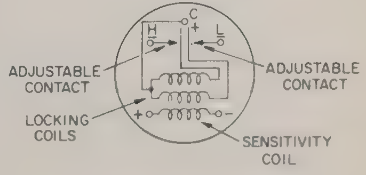
(Prices shown below are for single contact, single aiding coil relays)

D-C Range	Resistance Ohms ±20%
0-20 μa	10,000
0-50 μa	3,700
0-100 μa	1,360
0-200 μa	600
0-500 μa	120
0-1 ma	35
0-5 ma	4
0-20 ma	1.0
0-1 amp	0.099
0-50 mv	50
0-100 mv	100
0-10 v	1,000 Ω v
0-150 v	1,000 Ω/v

MICROAMPERES
D.C.
WESTON
5
10
15
20
0







View from Back

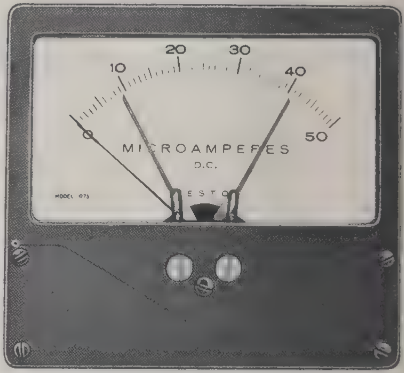
SURCHARGES

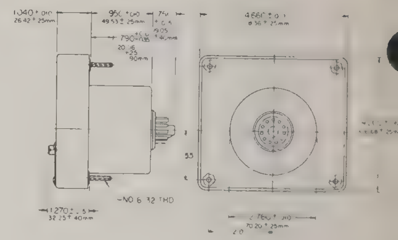
Additional Contact . . . . . .
Additional Aiding Coil . . . .
Suppressed Zero . . . .
Rectifier Type . . . .
Isolation between sensing coil and locking coil: above 70 volts to 200 volts, d-c continuous . . . .

All dimensional diagrams approximate.

non-physical contact relay

MODEL 1075





GENERAL: Model 1075 non-physical contact relay uses the WESTON® taut band external magnet type mechanism. It has a long vane attached to the pointer, photoconductive cells attached to the set pointers, lamps, and a transistor switching circuit. A double ended power supply (Model 9980 Type 1075, page 37) can be provided for use as a voltage source for switching circuits and lamps.

Solid state switching provides ultra reliable contact with no metal-to-metal wear. Continuous reading up or down scale after contact is made and automatic reset are a few of the many features of this versatile relay.

Standard Single High Set Point "In Rest" circuitry operates as follows: Until the pointer reaches the contact set-point, the photocell is illuminated. The "light" resistance of the cell is so connected in the circuitry, as to cut off the transistor and maintain the load relay in an unenergized state.

When the pointer reaches the set-point, the pointer vane covers the cell, cutting off its light source. The "dark" resistance of the cell allows the transistor circuitry to conduct and energize the relay. The load relay remains energized as long as the pointer is at or above the high set-point.

As the pointer passes below the high set-point, the photocell is again "lighted", the transistor cut off, and the load relay de-energized.

When required and specified by the customer, "Work Current" circuitry can be provided, whereby the above described operation is reversed. This configuration energizes the load relay until the high set-point is reached.

RANGES: See listing.

MAXIMUM SENSITIVITY: 5 microamperes with 80° scale angle.

ACCURACY: ±2% of full scale for d-c ranges. Set-point accuracy is an additional ±2% of full scale value, and repeatability is 1% maximum (with conditions duplicated). A.C. indicator accuracy ±3% of full scale.

LAMP LIFE: 8000 hours minimum, 30,000 hours nominal when used with Model 9980 Type 1075 Power Supply. Lamps (G.E. #1847), readily accessible from front for replacement purposes.

LOAD RELAY: Model 1074, Type 6 Power Relay — purchased as accessory (see page 38).

LINE VOLTAGE: 115 volts, 60 cycles, ±10 volts a-c.

SCALE: 95 degrees — 3.47 inches.

ZERO SUPPRESSION: Varies with ranges; 1¼ scale lengths maximum.

CIRCUIT: Utilizes one photoconductive cell and transistor switching circuit per set point. (Self-contained.)

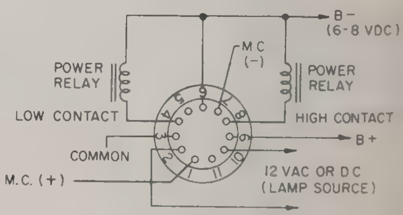
PHOTOCELL: Cadmium Selenide — 1500 ohms resistance when illuminated to a color temperature of 2870°K at 2 foot-candles.

DIELECTRIC: 2,000 volts rms, live circuits to case (test value).

TRANSISTOR: PNP Germanium — power dissipation rating is 120 mw at 25°C.

OPERATING TEMPERATURE: Minus 20°C to plus 50°C.

MOUNTING: Vertical panel mounting is standard.



View from Back

System Interconnection Wiring Diagram

All dimensional diagrams approximate.

MODEL 1075 (continued)

CASE STYLE: Flush, phenolic.

POWER SUPPLY REQUIREMENTS*: 6-0-6 volts d-c to 8-0-8 volts d-c at 0-70 ma, and 11.5 volts a-c (±1.3 volts) at 150 ma. The power supply output must be within this tolerance with an input of 115 volts a-c (±10 v) at 60 cycles. The nominal 7-0-7 volts d-c provides circuit polarization and the 11.5 volts a-c is used for lamp illumination.

CONTROL POINT BAND (Difference in Actuation Point, When Pointer is Moving Up or Down Scale.) — Maximum of 1 degree.

MINIMUM SEPARATION: 5 degrees between double set points.

APPROX. WEIGHT: 1.51 lb.

*All power supply requirements are designed into Model 9980 Type 1075. See page 37.

RANGES

D-C Range	Resistance Ohms ±20%	SINGLE HIGH SET POINT		DOUBLE SET POINT	
		CATNO		CATNO	
0-10 μa	6,200	1075-5602010 **		1075-5601010	
0-20 μa	2,500	1075-5602020 **		1075-5601020s	
0-50 μa	960	1075-5602050s **		1075-5601050s	
0-100 μa	760	1075-5602100 **		1075-5601100	
0-200 μa	140	—		—	
0-500 μa	30	—		—	
0-1 ma	12	1075-4602001s **		1075-4601001s	
0-5 ma	2.5	—			
0-20 ma	1.25	1075-4602020 **		1075-4601020	
0-1 amp	.050	1075-2602001 **		1075-2601001	
0-20 mv	20*±2%	—		—	
0-50 mv	50*±2%	1075-9602050s **		1075-9601050s	
0-100 mv	100*±2%	—		—	
0-10 v	1,000 Ω/v	1075-1602010 **		1075-1601010	
0-150 v	1,000 Ω/v	1075-1602150 **		1075-1601150	
0-500 v	1,000 Ω/v	—		—	

*Specify external lead resistance if greater than 0.1 ohm.
s–Normally carried in stock.

PYROMETERS

Temperature Ranges °F	°C	Couple	DOUBLE SET POINT	
			CATNO	
0-750†	0-400†	I/C (J)	1075-8601001	
0-1000†	0-500†	I/C (J)	1075-8601002	
0-1500†	0-800†	I/C (J)	1075-8601003	
0-2000†	0-1100†	C/A (K)	1075-8601004	
0-2500	0-1400	C/A (K)	1075-8601005	

All standard Pyrometers calibrated for use with 10 ohm external lead resistance. For particular applications; specify lead resistance.

**Prices do not include thermocouple.

†Bimetallic cold end compensation included.

non-physical contact relay

1930/1940 SERIES

GENERAL: The 1930/1940 Series of relays harmonize with the Weston Series 1900 panel meters. Completely self-contained, these instruments are capable of carrying and interrupting five (5) amperes at 115 volts a-c resistive load when used with the Model 9776 Power Module (see below). Attractively priced, these relays eliminate the problems of contact failure associated with metal contacts through use of a light source and a photoconductive cell. The power relay is normally energized and when the pointer reaches the set point, a vane attached to the pointer blocks the beam of light shining on the cell and thus de-energizes the power relay. The circuit configuration is shown in the following schematics.

The 1930/1940 Series with the attached Model 9776 Power Module are designated Models 1935 and 1945.

RANGES: See Listing.

MAXIMUM SENSITIVITY: 100 microamperes.

MECHANISM: Weston CORMAG® (core magnet moving coil type)

ACCURACY: ±2% of full scale as an indicator; ±3% of full scale setpoint accuracy in addition to indicator accuracy (including repeatability). AC meter accuracy ±3% of full scale.

LAMP: A1C, high brightness, neon, 25,000 hours nominal life.

LINE VOLTAGE: 115 volts (±10 volts a-c) 60 cycles.

SCALE: 100 degrees — 2.76″ on Model 1930; 3.93″ on Model 1940. Note pointer does not read beyond set point.

PHOTOCELL: Cadmium Selenide. Dark resistance 500 KΩ min.; Light resistance 12 KΩ max.

DIELECTRIC: 250 volts rms between circuits; 2500 volts rms between circuits and mounting studs. (These voltages not recommended for continuous use).

OPERATING TEMPERATURE: Minus 20°C to plus 50°C.

CONTROL POINT BAND: (Difference in control point, when photocell is covered and uncovered). Maximum of 2% when operated with Model 9776 Power Module.

LOAD RELAY and ASSOCIATED CIRCUITRY: Provided in Model 9776 Power Module.

CASE: Black phenolic.

FRONT: Black phenolic (std) or clear plastic on special order.

MOUNTING: Vertical panel mounting is standard.

SET POINT: Single high or single low. High set point is furnished unless otherwise specified on order.

POWER MODULE

GENERAL: The Weston Model 9776 Power Module contains a 115 volt a-c 5 ampere, resistive load single pole, double throw power relay and suitable triggering circuitry for use with Weston Models 1930 and 1940 relays. It is housed in a thermosetting plastic case, and can be panel-mounted in any convenient location for electrical connection to the Model 1930 or 1940. When this unit is furnished mounted directly on the rear of either the Model 1930 or 1940, the combined units are designated as Model 1935 or 1945.

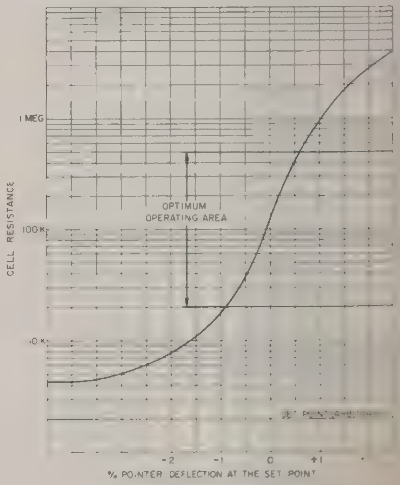
This power module can be used with an external photoconductive cell as a light operated relay. The cell should have characteristics within the operating area as shown in the Resistance vs Deflection curve.

(continued)

MILLIAMPERES
D.C.
WESTON
2
4
6
8

Models 1930/1940 with Clear Plastic Front.

Models 1935/1945 with Bakelite Front and Power Module.



The 1930/1940 may be used to trigger the customer's circuit such as SCR's, etc. Triggering should be within the optimum area of the Resistance vs Deflection curve. The cell is rated for 125 milliwatts at 25°C and should be derated 2.5 mw/°C. This curve is approximate, since individual photocells vary.

POWER MODULE (continued)

INPUT: 117 ±10 volts a-c.

CONTACTS: SPDT 5 amperes 115 volts, 60 cycles a-c or 28 volts d-c (Resistive load).

RATED CONTACT LIFE: 100,000 operations minimum.

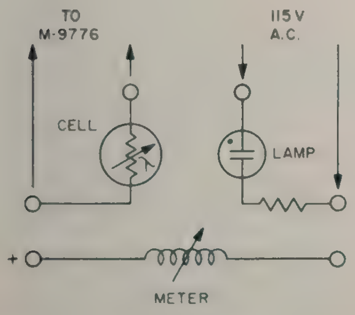
CATNO 9776-9977600

Range	Resistance Ohms ±20%	Model 1930		Model 1940		Model 1935		Model 1945	
		CATNO**		CATNO**		CATNO**		CATNO**	
0-50 μa	5160								
0-100 μa	1675	1930-5622100s		1940-5622100s		1935-5622100s		1945-5622100	
0-200 μa	1180	—		—		—		—	
0-500 μa	140	—		—		—		—	
0-1 ma	53	1930-4622001		1940-4622001s		1935-4622001s		1945-4622001s	
0-5 ma	3.6	—		—		—		—	
0-10 ma	2.3	—		—		—		—	
0-20 ma	2.2	—		—		—		—	
0-1 amps■	50 mv ±10%	—		—		—		—	
0-20 mv*	200 Ω/v not copper compensated	—		—		—		—	
0-50 mv*	200 Ω/v	1930-9622050		1940-9622050		1935-9622050s		1945-9622050s	
0-100 mv*	200 Ω/v	—		—		—		—	
0-1 v	1,000 Ω/v	—		—		—		—	
0 to 200 v	1,000 Ω/v	—		—		—		—	

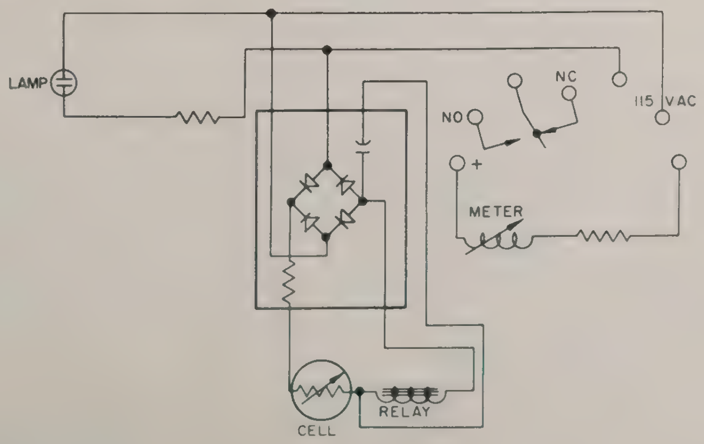
*Specify external lead resistance if greater than 0.1 ohm. s-Normally carried in stock.

**All stocked units have black phenolic front and high set pointer.

■Max. 10 amps Self Contained.



Models 1930/1940
View from Back

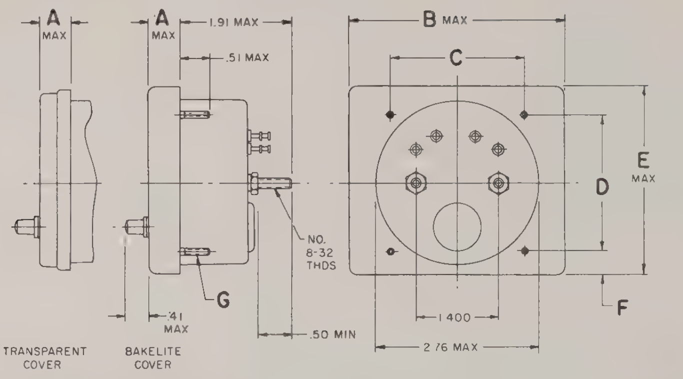


Models 1935/1945
View from Back

(continued)

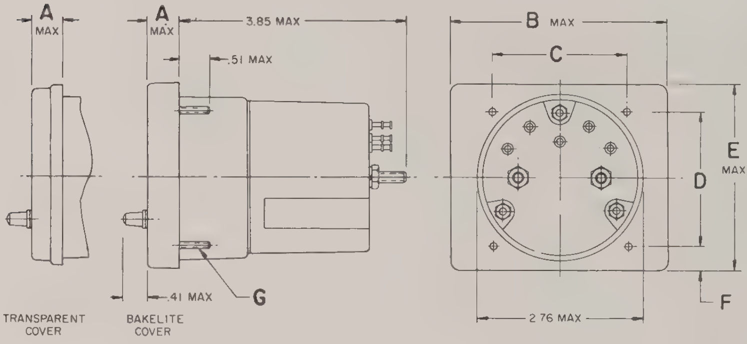
1930/1940 SERIES (continued)

Models 1930/1940

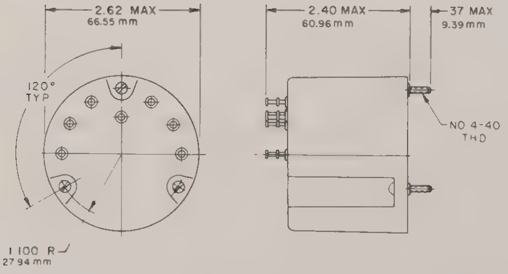

A MAX
A MAX
1.91 MAX
.51 MAX
B MAX
C
D
E MAX
F
NO. 8-32 THDS
G
.41 MAX
.50 MIN
1.400
2.76 MAX
TRANSPARENT COVER
BAKELITE COVER

MODEL	COVER	A	B	C	D	E	F	G
1930	TRANSP.	.51	3.51	2.250	2.250	2.99	5/16	NO.4-40 THDS
	BAKELITE	.56	3.66			3.14	25/64	
1940	TRANSP.	.56	4.53	4.000	3.560	4.07	1/4	NO.6-32 THDS
	BAKELITE		4.68			4.22	.320	

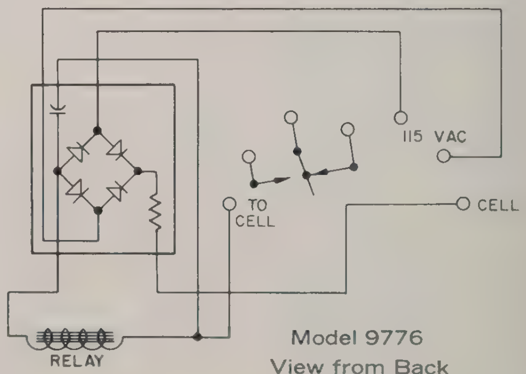
Models 1935/1945
(Includes Power Module)


A MAX
A MAX
3.85 MAX
.51 MAX
B MAX
C
D
E MAX
F
.41 MAX
G
2.76 MAX
TRANSPARENT COVER
BAKELITE COVER

MODEL	COVER	A	B	C	D	E	F	G
1935	TRANSP.	.51	3.51	2.250	2.250	2.99	5/16	NO.4-40 THDS
	BAKELITE	.56	3.66			3.14	25/64	
1945	TRANSP.	.56	4.53	4.000	3.560	4.07	1/4	NO.6-32 THDS
	BAKELITE		4.68			4.22	.320	


2.62 MAX
66.55 mm
2.40 MAX
60.96 mm
.37 MAX
9.39 mm
120° TYP
NO 4-40 THD
1.100 R
27.94 mm

Model 9776

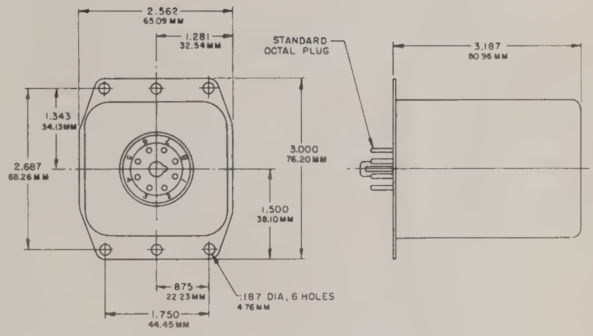

115 VAC
TO CELL
CELL
RELAY

Model 9776
View from Back

All dimensional diagrams approximate.

POWER SUPPLIES

The Weston Model 9980 Power Supply consists of a transformer, resistors, capacitors and silicon diodes, all mounted in a rectangular steel can. A cover, equipped with an octal type plug, is used to provide external mounting means and electrical connections. Available in several types, these power supplies are specifically designed for use with Weston Sensitive and SENSITROL® relays.


2.562
65.09 MM
1.281
32.54 MM
STANDARD OCTAL PLUG
3.187
80.96 MM
1.343
34.13MM
2.687
68.26 MM
3.000
76.20 MM
1.500
38.10 MM
.875
22.23 MM
.187 DIA, 6 HOLES
4.76 MM
1.750
44.45 MM

Model 9980 Types 6, 100, 1075

MODEL 9980 TYPE 6 (Single Power Supply)

(For use with Model 1074 Type 6 Power Relay)

INPUT: 117 ±10 volts, 50–60 cycles a-c.

OUTPUT: 6 volts d-c at 200 ma.

APPROX. WEIGHT: 1.21 lbs.

CATNO 9980-9902006s

MODEL 9980 TYPE 100 (Double Power Supply)

(For use with Model 1074 Type 115 Power Relay)

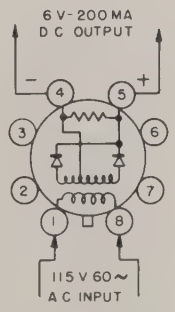
GENERAL: Three outputs may be obtained from two identical half wave circuits on alternate half cycles or a voltage doubling output when the entire waveform is utilized. Both half-wave voltages cannot be obtained from the power supply simultaneously at rated load.

INPUT: 117 ±10 volts, 50–60 cycles a-c.

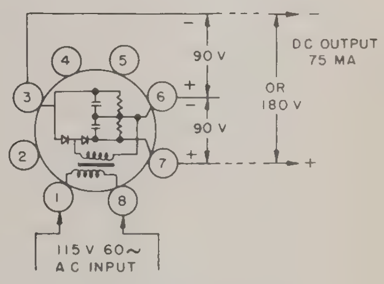
OUTPUT: 90 or 180 volts d-c at 75ma.

APPROX. WEIGHT: 1.21 lbs.

CATNO 9980-9902100s


6 V - 200 MA
D C OUTPUT
−
+
1
2
3
4
5
6
7
8
115 V 60~
A C INPUT

Model 9980 Type 6


DC OUTPUT
75 MA
−
90 V
+
−
90 V
+
OR
180 V
1
2
3
4
5
6
7
8
115 V 60~
A C INPUT

Model 9980 Type 100

MODEL 9980 TYPE 1075

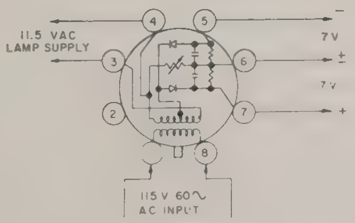
GENERAL: Model 9980 Type 1075 is designed for use with the Model 1075 Non-Physical Contact relay.

INPUT: 117 ±10 volts, 50–60 cycles a-c.

OUTPUT: 6-0-6 volts to 8-0-8 volts d-c at 78 ma; 11.5 volts a-c (±1.3 volts) at 150 ma; nominal 7-0-7 volts d-c provides circuit polarization; 11.5 volts a-c is for lamp illumination.

APPROX. WEIGHT: 1.21 lbs.

CATNO 9980-9901075s


11.5 VAC
LAMP SUPPLY
−
7 V
±
7 V
+
2
3
4
5
6
7
8
115 V 60~
AC INPUT

Model 9980 Type 1075

s Normally carried in stock.

POWER RELAYS

The Weston Model 1074 Power Relays are of the double pole, double throw type, with contacts rated at 5 amperes, 115 volts a-c or 28 volts d-c, non-inductive. They are of the plug-in type and connection is by standard octal plug.

MODEL 1074 TYPE 6

GENERAL: Use with non-physical contact, magnetic contact, and sensitive contact types.

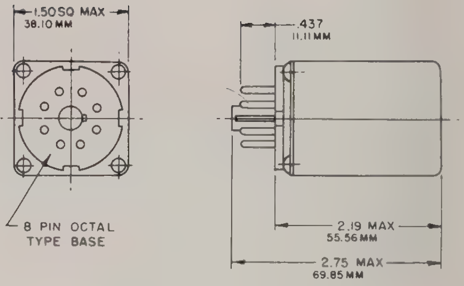
COIL RESISTANCE: 200 ohms.

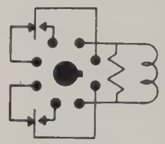
COIL CURRENT: 30 ma.

COIL VOLTAGE: 6 volts d-c

APPROX. WEIGHT: 0.60 lb.

CATNO 1074-9901006s


1.50 SQ MAX
38.10 MM
.437
11.11 MM
8 PIN OCTAL
TYPE BASE
2.19 MAX
55.56 MM
2.75 MAX
69.85 MM



WIRING DIAGRAM
(UNENERGIZED)

Model 1074 Type 6

MODEL 1074 TYPE 115 A-C

GENERAL: Use with magnetic contact type.

COIL RESISTANCE: 1600 ohms d-c.

COIL CURRENT: 35 ma.

COIL VOLTAGE: 115 volts a-c

CATNO 1074-9902110s

MODEL 1074 TYPE 115 D-C

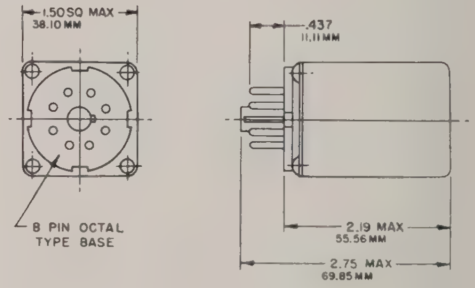
GENERAL: Use with magnetic contact relays Models 705, 723, 813, 1085, 1092; and LCCA relays 1093 and 1097.

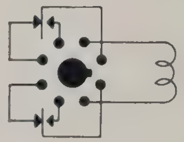
COIL RESISTANCE: 6000 ohms.

COIL CURRENT: 20 ma.

COIL VOLTAGE: 115 volts d-c.

CATNO 1074-990110s


1.50 SQ MAX
38.10 MM
.437
11.11 MM
8 PIN OCTAL
TYPE BASE
2.19 MAX
55.56 MM
2.75 MAX
69.85 MM



WIRING DIAGRAM
(UNENERGIZED)

Model 1074 Types 115 a-c or d-c

s–Normally carried in stock.

WESTON EXPERIENCE IN PRECISE INSTRUMENTATION IS YOURS FOR THE ASKING

Note the extensive types of Weston instrumentation listed below. Literature describing these devices is yours for the asking.

Or better still, call for the prompt, efficient service of our sales-engineering specialists in your area . . . they are backed by the Weston Engineering Staff . . . leaders in research and development in all measurement problems.

PANEL/SWITCHBOARD: Voltmeters . . . Ammeters . . . Milliammeters . . . Microammeters . . . Wattmeters . . . Galvanometers . . . Frequency Meters . . . VU and DB Meters . . . Ruggedized Instruments . . . Motor Load-Percent Indicators . . . Power Level Meters . . . Thermo Instruments . . . VARmeters . . . Power Factor Meters . . . Frequency Meters . . . Potential Converters . . . Projection Instruments . . . Mounting Bases . . . Adjustable Ratio Current Transformers . . . Shunts . . . Resistor Boxes . . . Shunt Leads . . . Transformers

DIGITAL PANEL INSTRUMENTS

CONTROL COMPONENTS: Sensitive Relays . . . Small Power Relays . . . Ruggedized Relays . . . Electronic Controls . . . Solid State Relays

TRANSDUCERS: Generators (conventional or special mounting types) for A-C, D-C or Frequency Responsive systems . . . Indicators (Switchboard, Panel, Portable) . . . D-C Amplifiers . . . Copper Oxide Rectifiers . . . Thermal Converters . . . Thermoelements

STANDARDS/PORTABLE: Voltmeters . . . Volt-Ammeters . . . Millivoltmeters . . . Volt-Millivoltmeters . . . Ammeters . . . Microammeters . . . Milliammeters . . . Microfarad Meters . . . Ohmmeters . . . Galvanometers . . . Power Factor Meters . . . Phase Angle Meters . . . Wattmeters . . . Frequency Meters . . . Electrolysis Instruments . . . Transformers . . . Precision Shunts . . . Standard Cells . . . Electronic Mill-Volt/Ammeters . . . Clamp Ammeters and Volt-Ammeters . . . Communication Lines Analyzers . . . Industrial Analyzers . . . Industrial Circuit Testers . . . Insulation Testers . . . Volt-Ohmmeters . . . Volt-Ohm-Milliammeters . . . Foot-Candle Meters . . . Illumination Meters . . . Sightmeters . . . Moisture Meters for Wood . . . Multi-Range D-C Amplifiers . . . A-C and D-C Calibration Consoles . . . Volts to Frequency Converters

AEROSPACE: Voltmeters . . . Ammeters . . . Volt-Ammeters . . . Shunts . . . Current Transformers . . . Frequency Indicators . . . Resistance Thermometers . . . Thermocouple Thermometers . . . ILS Indicators . . . Course Indicators Trim Tab Indicators . . . Special Instruments

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614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
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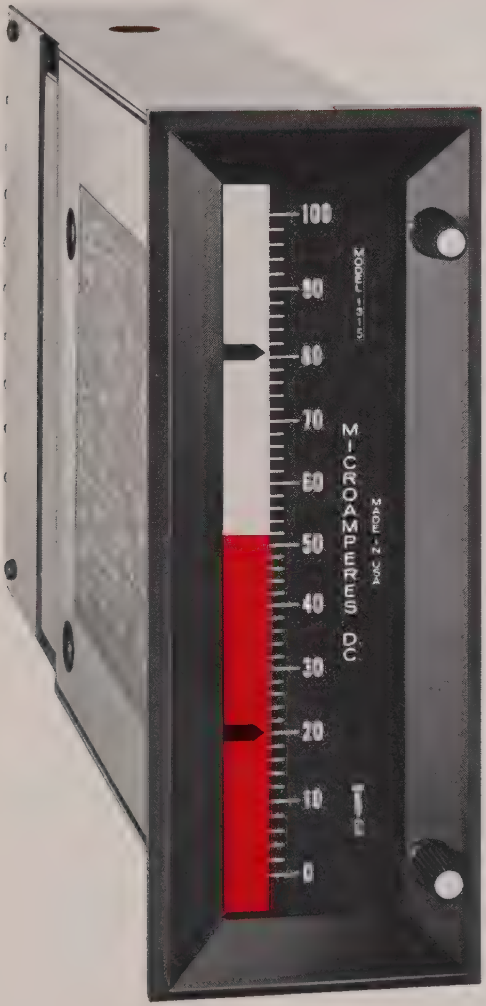
WESTON®

MODEL 1315 OPTICAL RIBBON INDICATOR RELAY



The Weston Model 1315 Optical Ribbon Indicator Relay provides three important features required for new and diverse applications in areas of industrial research, chemical processing, and medical electronics: bar graph visual display, accurate control capability, and fail-safe operation.

The Model 1315 features an illuminated moving bar display and is available with either one or two set points. Indication accuracy is ±2%; repeatability is ±0.5%.

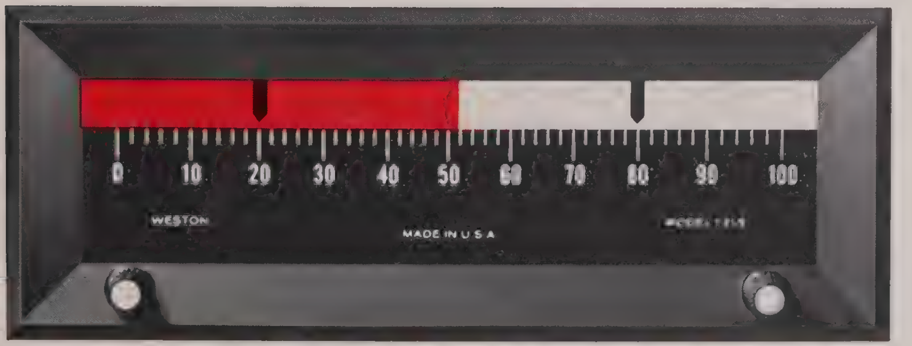
The output available from each control power relay is ten amperes per set point non-inductive. Switching is accomplished by a light-activated SCR for each set point. Set points are adjusted by front panel controls.

The Model 1315 is self-illuminated, utilizing a single lamp operated at 11.0 volts AC ±10%. Expected lamp life is 5,000 hours (minimum). Horizontal or vertical scales are available. Scale length is 4½ inches.

For optimum readability under high illumination environment (over 125 foot candles) contact Weston for mounting recommendations.

FEATURES

- Illuminated moving bar display
- Accuracy ±2%
- Vertical or horizontal scales
- High, low, or high and low set points
- Repeatability ±0.5%
- 10 amps per set point switching capability
- Complete isolation between measuring and control circuits
- Read through
- Fail-safe control mode circuitry



MODEL 1315 OPTICAL RIBBON INDICATOR RELAY

SPECIFICATIONS

Accuracy 2% of Full Scale Value.
Scale length 4½″.
Scale color White figures and divisions on black background. Standard Ribbon color is red.
Shielding Per C 39.1 1964 to allow side by side mounting.
Mounting Horizontal or Vertical. Stocked units are vertical.
Lamp Tung-Sol No. 561 operated at 11 volts ±10% 0.8 Amps AC, 5000 hours minimum expected life.
Set points Single Low, Single High or both. High and Low set point adjustment. Each set point adjustable from 5% to 95% of scale range. Minimum separation 5% FS.
Repeatability ±0.5%
Coincidence error ±0.5%
Switching capability 10 amps AC non-inductive from SPDT power relays.
Switching circuitry Two light-activated SCR's (normally illuminated to energize power relay) are darkened by moving bar to release power relay. Circuit is fail-safe since bulb or power failure will revert power relays to the control mode.

On zero center instruments the low side index will operate in reverse.

RANGES

DC AMPERES

Ranges up to 5 amps can be self-contained. For higher ranges, meters with approximately 50 mv drop can be supplied for use with standard switchboard shunts.

DC MILLIAMPERES

Range	Resistance
0-1	14.0 Ohms
0-2	2.8 Ohms
0-5	10.0 Ohms
0-10	5.0 Ohms
0-20	2.5 Ohms
0-25	2.0 Ohms
0-50	1.0 Ohm
0-100	0.5 Ohm
0-250	0.2 Ohm
0-500	0.1 Ohm

DC MICROAMPERES

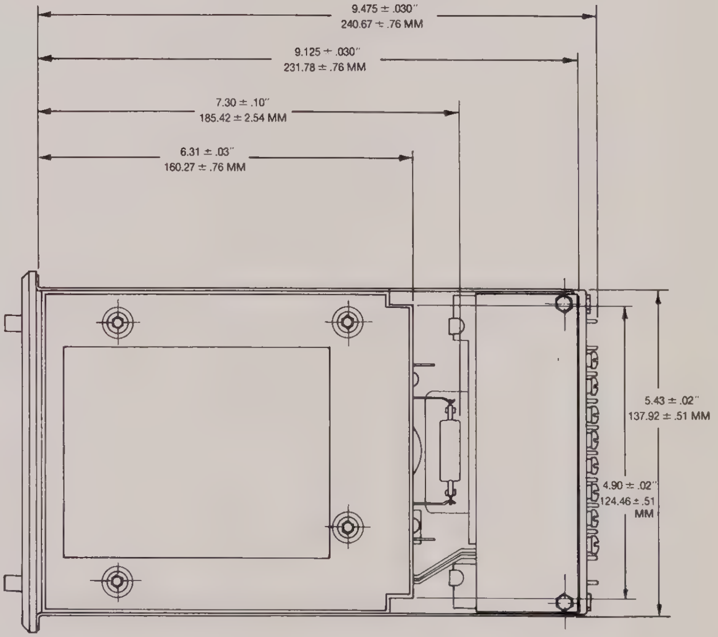
Range	Resistance (±20%)
0-20	5585 Ohms
0-50	604 Ohms
0-100	146 Ohms
0-200	60 Ohms
0-500	14 Ohms

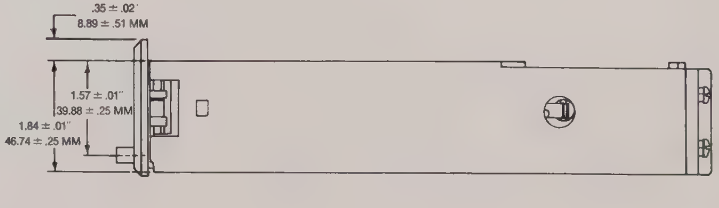
DC VOLTS

Range	Resistance
0-1	1000 Ohms/Volt
0-5	1000 Ohms/Volt
0-10	1000 Ohms/Volt
0-20	1000 Ohms/Volt
0-50	1000 Ohms/Volt
0-100	1000 Ohms/Volt
0-150	1000 Ohms/Volt
0-200	1000 Ohms/Volt
0-300	1000 Ohms/Volt
0-500	1000 Ohms/Volt

DC MILLIVOLTS

Range	Resistance
0-50	500 Ohms/Volt
0-100	500 Ohms/Volt





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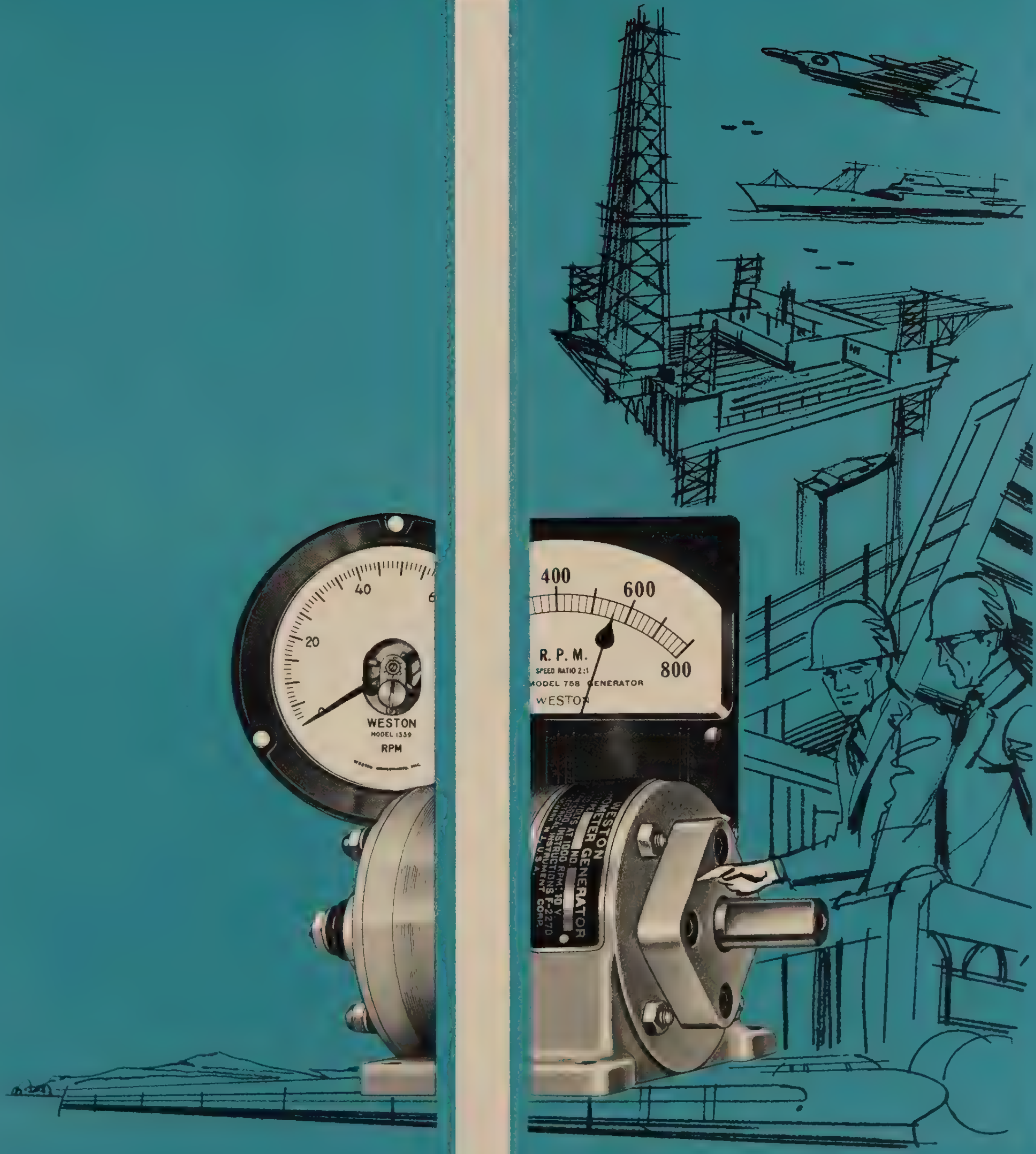
40
20
WESTON
MODEL 1339
RPM
400
600
800
R. P. M.
SPEED RATIO 2:1
MODEL 758 GENERATOR
WESTON
WESTON
GENERATOR

speed measurement and control

TABLE OF CONTENTS

- ORDERING INFORMATION 3
- WARRANTY 3
- GENERAL INFORMATION 4
  - Overall Accuracy of Tachometer System 4
  - Speed Ratio and Speed Differential Measurement 4
- DC SYSTEMS 5
  - Direct Current Generators — Model 750 6
    - Base Mounting 6, 7
    - Pad Mounting (AN) 7
    - Screw Mounting (S.A.E.) 8
    - Barbour Stockwell Gear Boxes 8
  - Characteristics of Model 750 9
  - Speed Ratio Tach System 10, 11
  - Accessories 11
- AC SYSTEMS 12
  - AC Voltage Responsive 12
  - Low Cost Tachometer 12
  - AC Generators — Model 758 13
    - Base Mounting 13
    - Pad Mounting (AN) 14
    - Screw Mounting (S.A.E.) 13-15
  - Accessories 15
  - Characteristics of Model 758 16
  - AC Frequency Responsive 17
  - Speed Differential Measurements 17
  - Bearingless Generators — Model 758 17, 18
  - Characteristics of Bearingless Generators 19
  - Frequency Responsive Network 20
    - Model 9906 21
- AC AND DC TACHOMETER INDICATORS 22-26
- RELAYS 27

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IMPORTANT ORDERING INFORMATION

1. Model and Type number of generator. For Model 758 bearing type indicate whether it is the standard AC Voltage Responsive type (100 ohms) or the special AC Frequency Responsive "F" type (32 ohms).

2. Model number and case style of indicator; whether it is DC, RD (rectifier type), or FD (frequency responsive type).

3. Range of indicator, including units and scale caption desired. (A number of standard scale captions are available at no extra charge. In cases of special requirements, correspondence is necessary.)

4. Model and Type of generator with which indicator is to be used.

5. State number of indicators to be used with one generator and whether in series or parallel.

6. Relation of scale markings to rpm of generator shaft.

7. State operating and maximum speed of generator to be used with Model 273 Expanded Scale Indicator.

WARRANTY

Weston products are warranted to be of good workmanship and quality and free from defects. Our liability is limited to replacing the instrument, or any part thereof (except tubes, batteries or lamps), if our examination shall disclose it to have been defective under proper and normal use, provided it is returned prepaid to a Weston Authorized Sales-Servicenter, as directed by Weston, within one year after the date of purchase. We shall not be liable for consequential damages of any kind. This warranty is in lieu of all other warranties, liabilities, or obligations, statutory or implied, to the original purchaser or to any other person.

WESTON INSTRUMENTS DIVISION • Weston Instruments, Inc. • Newark, N. J. 07114

GENERAL INFORMATION

For many years Weston Electrical Tachometers have been used for industrial and military requirements. The simplicity of design, flexibility of application and reliability even under adverse operating conditions, permit their adaptation to a wide variety of uses. For remote readings the electrical tachometer has no equal.

Over and above the primary function of speed measurements Weston Tachometers play an important part in the control of machinery and processes. Installations of d-c and a-c systems have given extensive and satisfactory service as indicators, recorders and controllers in the manufacturing and processing industries and are easily applied to machines, engines and transportation equipment.

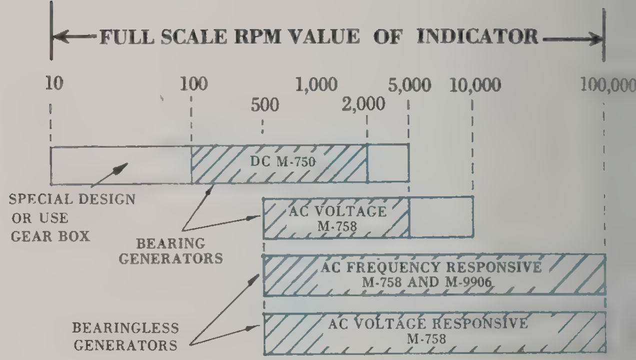
Every Weston Tachometer installation consists of one or more tachometer generators and one or more tachometer indicators, recorders and/or controllers. Three basic types of measurement are available; Speed, Speed Ratio and Speed Differential. All three types can be supplied in a variety of mechanical and electrical forms.

For the measurement of speed, a tachometer generator and some form of indicator or recorder is required. The instrument may be calibrated in RPM, Feet Per Minute, Yards per Minute, Miles Per Hour, Cycles Per Second or any unit that can be converted into a function of rotational speed.

Weston Speed Measurement Tachometer Systems are capable of giving continuous direct reading indication of speeds to 100,000 rpm. When considering an installation it is first necessary to decide whether a D-C, an A-C Voltage Responsive or an A-C Frequency Responsive System is best. The determining factors in order of importance are:

1. The top speed at which the tachometer generator will be operating.
2. The accuracy requirement.
3. The mechanical problem of mounting.

The following graph illustrates the recommended top speed at which each form of generator may be used. These limitations can be modified by the proper selection of the point of measurement or by means of suitable speed changing devices so that the generator speed is kept within the recommended limits. (See Page 8 for information on Weston supplied gear boxes.)



Overall Accuracy of Tachometer Systems

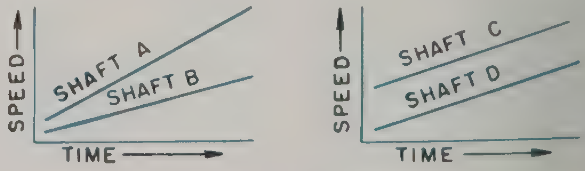
Overall Accuracy Desired	(Accuracy of Instrument Required)		
	D-C System	A-C Voltage Responsive System	*A-C Frequency Responsive System
±¼%	....	....	1/10%**
±¾%	....	....	¼%
±1%	....	....	½%
±1¼%	¼%	....	....
±1½%	½%	....	1%
±2%	1%	....	....
±2½%	....	1½%	2%
±3%	2%	....	....
±3½%	....	2½%	....

*Based on Model 9906 Type 3 Transformer Box.
**Based on use of Special Lab. Stand. Indicator.

SPEED RATIO and SPEED DIFFERENTIAL MEASUREMENTS

The relationship of two speeds may be expressed in a variety of ways. Two of the most common are speed ratio and speed differential.

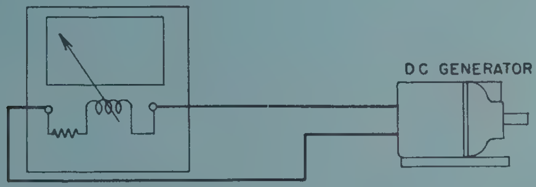
Shafts "A" and "B" are holding a constant "speed ratio" relationship. Shafts "C" and "D" are holding a constant "speed differential" relationship. The methods of measuring these two relationships are vastly different. (See Pages 10 and 11 for speed ratio measurements: See Page 17 for speed differential measurements.)



Speed Ratio vs Speed Differential

DIRECT CURRENT SYSTEMS

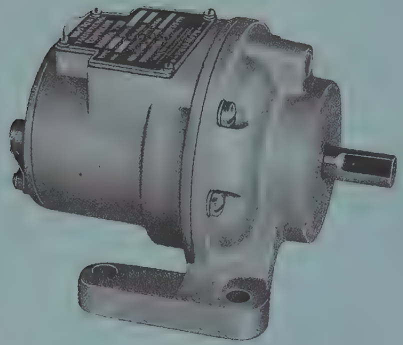
D-C (10-2000 rpm normal, 5000 rpm max.) *D-C Tachometer systems consisting of a d-c generator and a d-c indicator or recorder may be used when the top operating generator speed is at least 100 rpm and not more than 5,000 rpm. The special Model 273-D Indicator, (see Page 23), may be used for top operating generator speeds as low as 100 rpm. Top speeds as low as 10 rpm are possible on specific recorders. (See pages 6, 7 and 8 for descriptions of d-c generator.)*



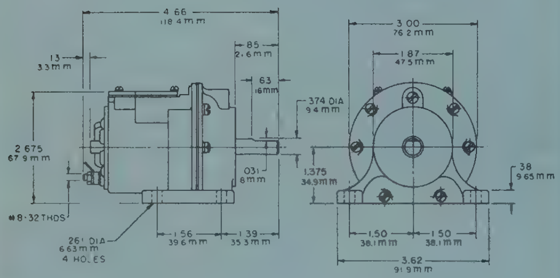
Circuit Diagram — D-C Installation

DIRECT CURRENT GENERATORS – MODEL 750

The Model 750 D-C Tachometer Generator embodies a permanent magnet field surrounding a rotating armature. The commutator segments are made from a specially hardened, non-corrosive alloy which has an exceptionally long life. The brushes are of a self-lubricating material and are carried in a self-aligning holder which equalizes the pressure of both brushes. The armature shaft rotates on ball bearings which under normal operation do not need lubrication for 15,000 hours running time or approximately 3 years, whichever comes first. Maximum recommended speed is 5,000 rpm. Brush life is greatest at the lower speeds.



Type A

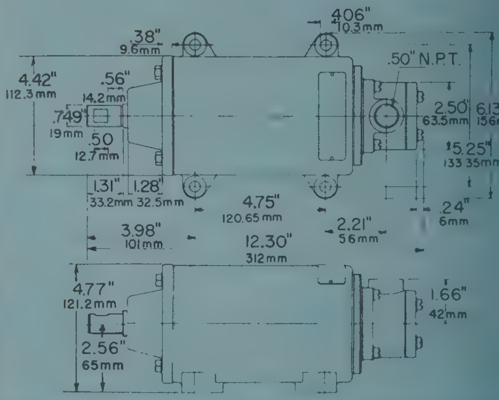

4 66
118 4mm
13
3.3mm
85
2.6mm
63
16mm
374 DIA
9 4mm
2 675
67 9mm
031
8mm
1.375
34.9mm
#8·32 THDS
26' DIA
6 63mm
4 HOLES
1 56
39 6mm
1 39
35 3mm
3 00
76 2mm
1 87
47 5mm
38
9 65mm
1.50
38.1mm
1 50
38.1mm
3.62
91 9mm

BASE MOUNTING

Type A — Rigid die-cast dust proof aluminum mounting base and housing. Has ⅜″ diameter shaft extension for direct coupling drive, pulley or spur gear and two binding posts.

Approx. Torque: Starting 1.0 oz-in
Running 1.0 oz-in at 1000 rpm
Approx. Weight ....1.7 lbs. (.77 kgs.)
Cat. No. 750-9901000

Type W


.406"
10.3mm
.38"
9.6mm
.50" N.P.T.
4.42"
112.3mm
.56"
14.2mm
.749
19mm
.50
12.7mm
2.50
63.5mm
6.13"
156mm
5.25"
133.35mm
1.31"
33.2mm
1.28"
32.5mm
4.75"
120.65mm
.24"
6mm
3.98"
101mm
12.30"
312mm
2.21"
56mm
4.77"
121.2mm
1.66"
42mm
2.56"
65mm

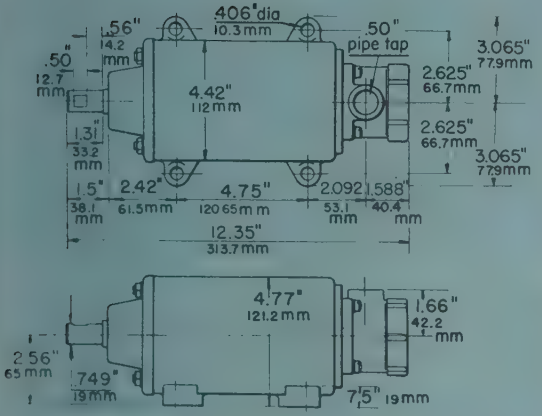
BASE MOUNTING

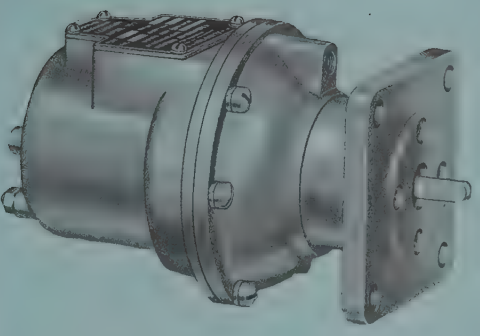
Type W — Rigid heavy duty cast iron base mounting type housing, with ¾″ diameter shaft supported by heavy duty ball bearings for direct coupling, pulley, spur gear or chain and sprocket drive. Provided with conduit junction box with ½″ N.P.T. opening suitable for flexible conduit which may be located in any one of four positions at right angle to shaft. Designed for locations which impose more or less severe operational conditions, such as mechanical abuse or water spray, as are found in paper mills and in chemical plants where cleaning up by hose is frequent. Housing is gasket sealed.

Approx. Torque: Starting 2.0 oz-in
Running 2.0 oz-in at 1000 rpm
Approx. Weight ....24.5 lbs. (11.1 kgs.)
Cat. No. 750-9905002

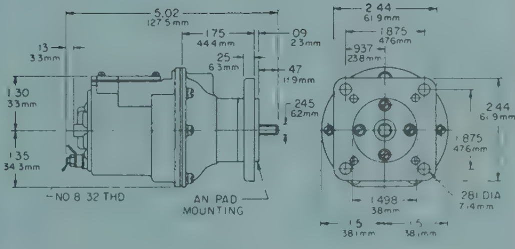
All dimensions are approximate.

Type E


.56"
14.2 mm
406" dia
10.3 mm
.50"
pipe tap
.50"
12.7 mm
3.065"
77.9mm
2.625"
66.7mm
4.42"
112mm
1.31"
33.2 mm
2.625"
66.7mm
3.065"
77.9mm
1.5"
38.1 mm
2.42"
61.5mm
4.75"
120.65mm
2.092
53.1 mm
1.588"
40.4 mm
12.35"
313.7mm
4.77"
121.2mm
1.66"
42.2 mm
2.56"
65mm
.749"
19mm
.75"
19mm



Type K3


5.02
127.5mm
13
3.3mm
175
44.4mm
09
2.3mm
25
6.3mm
47
11.9mm
1.30
33mm
245
6.2mm
1.35
34.3mm
NO 8 32 THD
AN PAD MOUNTING
2.44
61.9mm
1875
47.6mm
937
23.8mm
2.44
61.9mm
1.875
47.6mm
281 DIA
7.4mm
1.498
38mm
1.5
38.1mm
1.5
38.1mm

BASE MOUNTING

Type E — Similar to Type W but listed by Underwriters' Laboratories, Inc. for use in hazardous locations Division 1 (vapors exist continuously), Class 1, Group D and Class 2, Groups F and G. Class 1, either natural gas or the vapors from lacquer solvents, acetone, alcohols and petroleum derivatives, such as gasoline. Class 2, Groups F and G covers carbon black, coal or coke dust and grain dust, etc.

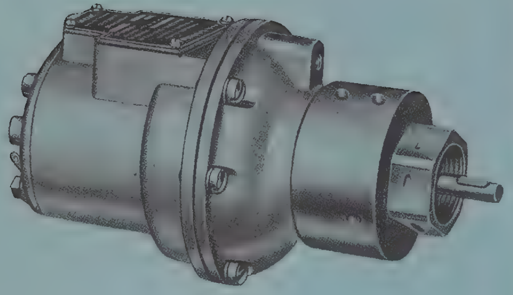
Approx. Torque: Starting 2.0 oz-in
Running 2.0 oz-in at 1000 rpm
Approx. Weight ....24.5 lbs. (11.1 kgs.)
Cat. No. 750-9905001

PAD MOUNTING (AN)

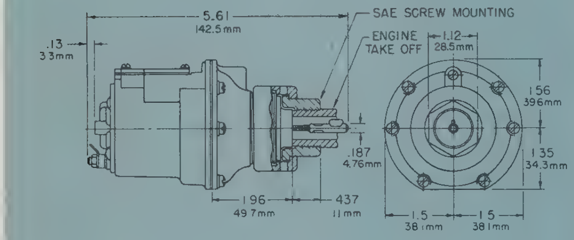
Type K3 — Square aluminum mounting pad with a dust proof aluminum alloy housing and ¼" square drive dog. Mounting pad in accordance with military drawing AND-20005. Two binding posts for electrical connections.

Approx. Torque: Starting 3.0 oz-in
Running 4.0 oz-in at 1000 rpm
Approx. Weight ....1.7 lbs. (.77 kgs.)
Cat. No. 750-9903000

All dimensions are approximate.



Type J2


5.61
142.5mm
.13
3.3mm
SAE SCREW MOUNTING
ENGINE TAKE OFF
1.12
28.5mm
1.56
39.6mm
.187
4.76mm
1.35
34.3mm
1.96
49.7mm
.437
11mm
1.5
38.1mm
1.5
38.1mm

SCREW MOUNTING (S.A.E.)

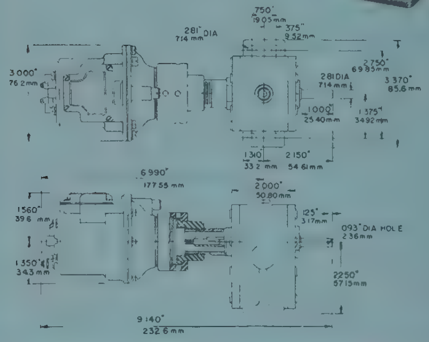
Type J2 — Standard S.A.E. ⅞″ screw type steel mounting with 3/16″ drive dog. Dustproof aluminum alloy housing with two binding posts for electrical connection. Recommended for use where a light weight small size generator is required. Chiefly used on Diesel and gas engines where a standard S.A.E. screw type tachometer outlet is available.

Approx. Torque: Starting 3.0 oz-in
Running 4.0 oz-in at 1000 rpm
Approx. Weight ....1.8 lbs. (.82 kgs.)
Cat. No. 750-9906000

Type J2R — Same as Type J2 except internal resistance is 200 ohms ±2%.

Cat. No. 750-9906002

Type M2 with Barbour Stockwell Gear Box


.750″
19.05mm
.375″
9.52mm
.281″ DIA
7.14 mm
3.000″
76.2mm
2.750″
69.85mm
.281 DIA
7.14mm
3.370″
85.6mm
1.000″
25.40mm
1.375″
34.92mm
1.310
33.2 mm
2.150″
54.61mm
6.990″
177.55 mm
2.000″
50.80mm
1.560″
39.6 mm
.125″
3.17mm
.093″ DIA HOLE
2.36mm
1.350″
34.3mm
2.250″
57.15mm
9.140″
232.6mm

SCREW MOUNTING (S.A.E.)

Type M2 — Similar to Type J2 except that the oil seal has been eliminated in order to reduce torque burden. Recommended for use with a low torque gear box such as the Barbour Stockwell Gear Box described below.

Approx. Torque: Starting 1.0 oz-in
Running 1.0 oz-in at 1000 rpm
Approx. Weight ....1.8 lbs. (.82 kgs.)
Cat. No. 750-9906001

BARBOUR STOCKWELL GEAR BOXES

Model 9933 — Small light-weight gear boxes which have standard S.A.E. tachometer outlets on one side and 9/32 inch shaft on the other. Recommended for use with Model 750 Type M2 Generators where a step-up in speed is required. The standard gear box has a step-up ratio of 1:10 with a starting torque of about 20 ounce-inches.

1:10 Step Up — Cat. No. 9933-9900001
Ratios Between 10:1 and 1:10—Model 9933
Ratios Between 1:10 and 1:40—Model 9933. These boxes are approximately twice the length of the standard box.

All dimensions are approximate.

MODEL 750 D-C TACHOMETER GENERATOR — CHARACTERISTICS

SPECIFICATION	TYPE A	TYPE W	TYPE E	TYPE K3	TYPE J2	TYPE M2
Voltage Output at 1000 RPM*	6 Volts ±1%	6 Volts ±1%	6 Volts ±1%	6 Volts ±1%	6 Volts ±1%	6 Volts ±1%
Accuracy	±1%	±1%	±1%	±1%	±1%	±1%
EMF Linearity[1]	±.15%	±.15%	±.15%	±.15%	±.15%	±.15%
Permissible Current Drain	50 MA	50 MA	50 MA	50 MA	50 MA	50 MA
Max. RMS Value of AC Ripple	2%	2%	2%	2%	2%	2%
Allowable End Play	.005″	.005″	.005″	.005″	.005″	.005″
Max. Operating Temperature	250°F.	250°F.	250°F.	250°F.	250°F.	250°F.
Internal Resistance at 25°C.	20 Ohms. ±2%	20 Ohms. ±2%	20 Ohms. ±2%	20 Ohms. ±2%	20 Ohms. ±2%	20 Ohms. ±2%
Number of Brushes	2 Per Set	2 Per Set	2 Per Set	2 Per Set	2 Per Set	2 Per Set
Composition of Brushes	Palladium Silver Alloy	Palladium Silver Alloy	Palladium Silver Alloy	Palladium Silver Alloy	Palladium Silver Alloy	Palladium Silver Alloy
Armature	12 Bars, 12 Slots	12 Bars, 12 Slots	12 Bars, 12 Slots	12 Bars, 12 Slots	12 Bars, 12 Slots	12 Bars, 12 Slots
Insulation	← INSULATION CLASS 105 →					
Hi-Pot Test	500 Volts for 1 min.	500 Volts for 1 min.	500 Volts for 1 min.	500 Volts for 1 min.	500 Volts for 1 min.	500 Volts for 1 min.
Bearings	Ball	Ball	Ball	Ball	Ball	Ball
Temperature Compensation	0.1% Per 10°C Change	0.1% Per 10°C Change	0.1% Per 10°C Change	0.1% Per 10°C Change	0.1% Per 10°C Change	0.1% Per 10°C Change
Normal Continuous Speed	2000 RPM	2000 RPM	2000 RPM	2000 RPM	2000 RPM	2000 RPM
Min. Top Speed	100 RPM	100 RPM	100 RPM	100 RPM	100 RPM	100 RPM
Max. Top Speed[2]	5000 RPM	5000 RPM	5000 RPM	5000 RPM	5000 RPM	5000 RPM
Starting Torque	1.0 oz. ins.	2.0 oz. ins.	2.0 oz. ins.	3.0 oz. ins.	3.0 oz. ins.	1.0 oz. ins.
Running Torque at 1000 RPM	1.0 oz. ins.	2.0 oz. ins.	2.0 oz. ins.	4.0 oz. ins.	4.0 oz. ins.	1.0 oz. ins.
Weight	1.7 lbs.	24.5 lbs.	24.5 lbs.	1.7 lbs.	1.8 lbs.	1.8 lbs.
Length	4.66″	12.3″	12.35″	5.02″	5.61″	5.61″
Height	2.87″	4.77″	4.77″	2.91″	2.91″	2.91″
Width	3″	6.13″	6.13″	3″	3″	3″
Mounting	Base	Base	Base	Sq. AN Pad	SAE ⅞″ Screw	SAE ⅞″ Screw
Enclosure	Dust Resis.	Weatherproof	Explosion Proof	Dust Resis.	Dust Resis.	Dust Resis.
Shaft Diameter	⅜″	¾″	¾″	¼″ Sq.	3/16″	3/16″
Shaft Connection	Direct, Geared or Belted	Direct, Geared or Belted	Direct, Geared or Belted	Direct	Direct	Direct
Shaft Length	.85″ (w/.63 Flat)	1½″	1½″	.47″	.47″	.47″
Adjustable Magnetic Shunt Range	±4%	±4%	±4%	±4%	±4%	±4%
Direction of Rotation Effect	±0.25%	±0.25%	±0.25%	±0.25%	±0.25%	±0.25%

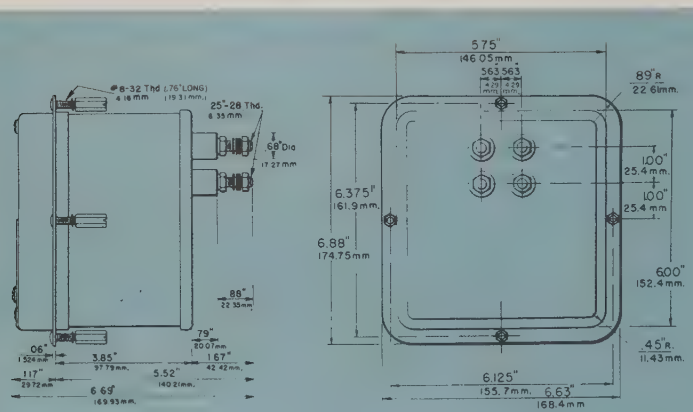
*Voltage outputs up to 40 V at 1000 rpm are available upon special request. Correspondence is necessary for related characteristics. Voltage outputs are expressed as open circuit values.

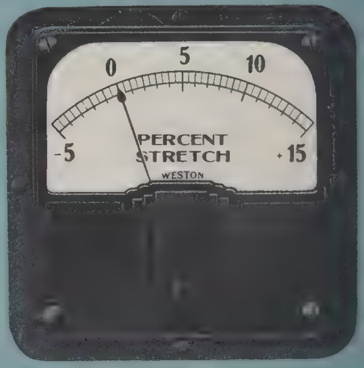
[1] On new or factory rebuilt generators.

[2] Continuous high speed operation necessitates shorter brush maintenance intervals.

SPEED RATIO TACHOMETER SYSTEM

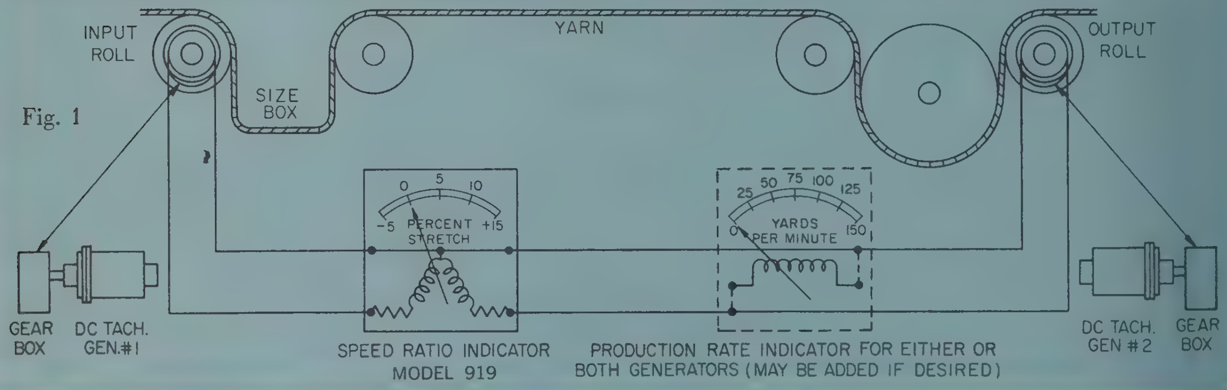
The Weston Speed Ratio Tachometer System provides a means of measuring the ratio of two rotational speeds electrically. In practice, the speed ratio tachometer measures the ratio of speeds of two direct current tachometer generators by means of a conventional ratio meter mechanism. Calibration is normally in terms of "per cent stretch", "ratio of draw", or "ratio of speed" on an indicator or recorder. Since this is a ratio, and consequently a pure number, the calibration cannot be RPM, etc. ■ Two or more DC Tachometer Generators are used with some form of ratio instrument. The instrument may be a double moving coil type of meter such as Weston 919 or a null-balancing potentiometer type ratio recorder. ■ In addition, production rate instruments may be added to the circuit to measure the speed of either or both Tachometer Generators. ■ Through a suitable switching arrangement the outputs of several pairs of generators may be selectively fed through the ratio and production rate instruments to provide readings from various sections of multi-stage machines.


#8-32 Thd (.76" LONG)
4.18mm (19.31mm.)
.25"-28 Thd.
6.35mm
.68" Dia
17.27mm
.88"
22.35mm
.79"
20.07mm
.06"
1.524mm
3.85"
97.79mm.
1.67"
42.42mm.
.117"
29.72mm
5.52"
140.21mm.
6.69"
169.93mm.
5.75"
146.05mm
.563 .563
4.29 mm 4.29 mm
.89" R
22.61mm.
1.00"
25.4mm.
1.00"
25.4mm
6.375"
161.9mm.
6.88"
174.75mm
6.00"
152.4mm.
.45" R.
11.43mm.
6.125"
155.7mm.
6.63"
168.4mm


0
5
10
-5
+15
PERCENT STRETCH
WESTON

Model 919, 921 or 921-RD

Fig. 1


INPUT ROLL
SIZE BOX
YARN
OUTPUT ROLL
0
5
10
-5
PERCENT STRETCH
+15
25
50
75
100
125
0
YARDS PER MINUTE
150
GEAR BOX
DC TACH. GEN.#1
SPEED RATIO INDICATOR MODEL 919
PRODUCTION RATE INDICATOR FOR EITHER OR BOTH GENERATORS (MAY BE ADDED IF DESIRED)
DC TACH. GEN #2
GEAR BOX

APPLICATION

This system has a wide field of application in the textile, paper and steel industries, among others, affording improved process control wherever it is important to know the ratio between two quantities expressible in terms of rotation.

In the textile field a common application involves the measurement of "per cent stretch" of various materials during the slashing operations (See Fig. 1). Paper mills have employed the system to control the amount of draw between rollers of successive sections of paper machines. The potential for similar installations in steel mills and other metal processing facilities is readily apparent.

LIMITS OF SPEED RATIO SYSTEM

Minimum generator speed—400 RPM due to voltage requirements of the instrument. Full scale range limits. 10% to 100% shrink.

CALCULATING PER CENT STRETCH

$$\%\ \text{Stretch} = \frac{\text{Output} - \text{Input}}{\text{input}} \times 100\%$$

Use speed of material rather than generator speeds since gearing of input and output generators may not be identical to produce "0 Stretch" reading on indicator.

EXAMPLE: If input generator = 100 yds. per min. and output generator = 125 yds. per min., then % stretch = 25%.

All dimensions are approximate.

The following information must be supplied to enable Weston to recommend the Speed Ratio equipment best suited to the user's specific requirements.

1. SPEED RATIO INDICATOR

Model number desired
Case style preferred — Flush or Surface
Specify scale caption and range.

For indicator price see page 26.

2. SPEED INDICATOR

(Production Rate Indicator)

Model number desired
Case style preferred — Flush or Surface
Specify scale caption and range
Will indicator measure input (feed) or output?

For indicator price see pages 23-26.

3. TACHOMETER GENERATORS

Model number desired
Specify speed range of machine (yards/min or other values)

4. INPUT (FEED) DRIVE

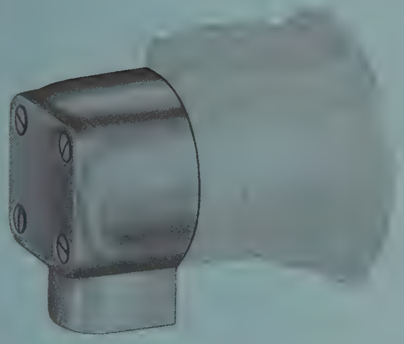
Specify revolutions of input roll for 10 yards per minute feed
Drive to be used:
- (a.) Weston supplied gear boxes or
- (b.) Customer supplied gears
  - Specify Gear Ratio between Driver and Driven gears
- (c.) Other

5. OUTPUT DRIVE

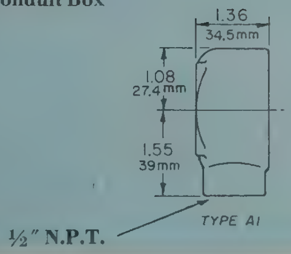
Specify revolution of output roll for 10 yards per minute feed
Drive to be used:
- (a.) Weston supplied gear boxes or
- (b.) Customer supplied gears
  - Specify Gear Ratio between Driver and Driven gears
- (c.) Other

ACCESSORIES

for MODEL 750 DC



Binding Post Conduit Box



BINDING POST CONDUIT BOX

Available for Model 750 Types A, J2 and K3 Generators. Conduit Box has ½″ N.P.T. opening suitable for flexible conduit connection.

Specify 9933-0143156

BRUSH REPLACEMENT KIT

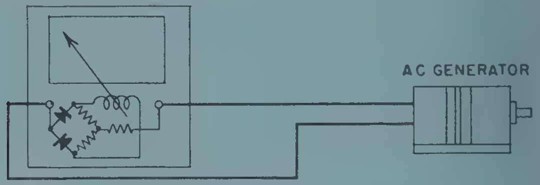
Contains all the necessary parts for replacing worn out brushes in all Model 750 d-c generators with installation instructions.

Specify 9999-249302

All dimensions are approximate.

ALTERNATING CURRENT SYSTEMS

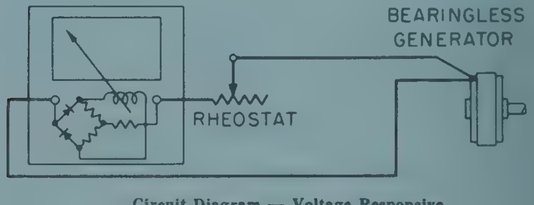
A-C Voltage Responsive (500-10,000 rpm): A-C *Voltage Responsive Tachometer systems consisting of an a-c generator and a rectifier type indicator may be used in any installation where the generator speed for full scale is not less than 500 rpm nor more than 5,000 rpm. With suitable attention given to bearings, conventional a-c generators may be used at speeds up to 10,000 rpm. Bearingless generators may be used in an A-C Voltage Responsive System; however it is recommended that for most installations these generators be used in an A-C Frequency Responsive System. (See Pages 13, 14 and 15 for descriptions of a-c generators.)*



Circuit Diagram — A-C Installation

Low Cost Tachometer: *Occasionally there is a requirement for a low cost tachometer wherein accuracy is not of prime importance. In this instance the bearingless generator can be used in conjunction with an inexpensive rectifier type instrument, such as the Model 962-RD in a voltage responsive system. When this combination is selected, allowance is made in the indicator adjustment for the insertion of a series rheostat by the customer.*

When installing the tachometer, the machine on which the generator is mounted is run at a known speed and the potentiometer is adjusted until the tachometer indicates the correct speed, then locked in place. Once this has been accomplished the installation will be accurate to within ±3-5% depending upon how accurately these adjustments are made.

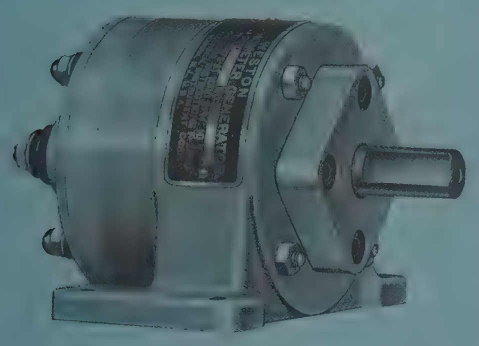


Circuit Diagram — Voltage Responsive Bearingless Tachometer

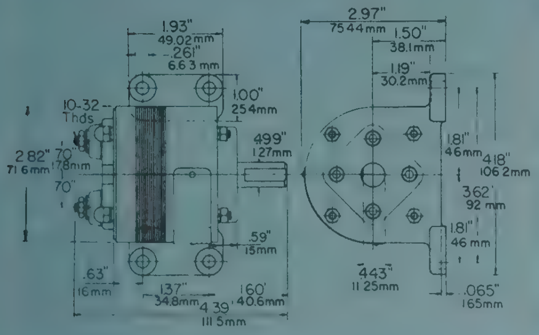
ALTERNATING CURRENT GENERATORS – MODEL 758

The Model 758 A-C Tachometer Generator embodies a stator surrounding a rotating ALNICO permanent magnet. The output of the generator for voltage responsive systems is temperature compensated and is proportional to the speed. The ball bearings need not be lubricated under normal operation for 15,000 hours running time or approximately three years, whichever comes first. Maximum recommended speed is 5,000 rpm but may be used up to 10,000 rpm under special conditions.

Generators for use in frequency responsive systems with Model 9906 (refer to page 21) are provided with a special low resistance stator and are identified by the letter "F" in the type designation. Available on all models at no extra charge.



Type AB

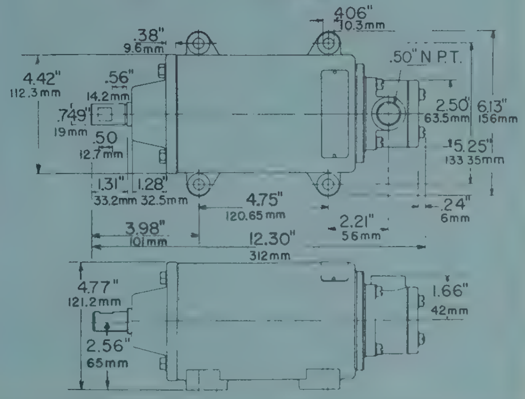

1.93"
49.02mm
.261"
6.63mm
10-32 Thds
1.00"
25.4mm
.499"
12.7mm
2.82"
71.6mm
.70"
17.8mm
.70"
.59"
15mm
.63"
16mm
1.37"
34.8mm
1.60"
40.6mm
4.39
111.5mm
2.97"
75.44mm
1.50"
38.1mm
1.19"
30.2mm
1.81"
46mm
4.18"
106.2mm
3.62"
92mm
1.81"
46mm
.443"
11.25mm
.065"
1.65mm

BASE MOUNTING

Type AB — Rigid cast aluminum base mounting. Light weight dust proof aluminum alloy housing. Has ½" diameter shaft extension for spur gear, chain and sprocket, pulley, or direct coupling drive, and two binding posts.

Approx. Torque: Starting 2.5 oz-in
Running 2.5 oz-in at 1000 rpm
Approx. Weight .... 2.89 lbs. (1.31 kgs.)
For Voltage Responsive Systems
Specify 758AB
Cat. No. 758-9901000
For Frequency Responsive Systems
Specify 758ABF
Cat. No. 758-9901001

Type W

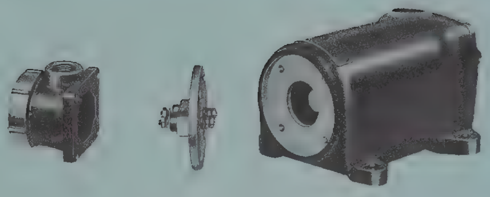

.406"
10.3mm
.38"
9.6mm
.50" N.P.T.
4.42"
112.3mm
.56"
14.2mm
.749"
19mm
.50
12.7mm
2.50
63.5mm
6.13"
156mm
5.25"
133.35mm
1.31"
33.2mm
1.28"
32.5mm
4.75"
120.65mm
.24"
6mm
2.21"
56mm
3.98"
101mm
12.30"
312mm
4.77"
121.2mm
1.66"
42mm
2.56"
65mm

BASE MOUNTING

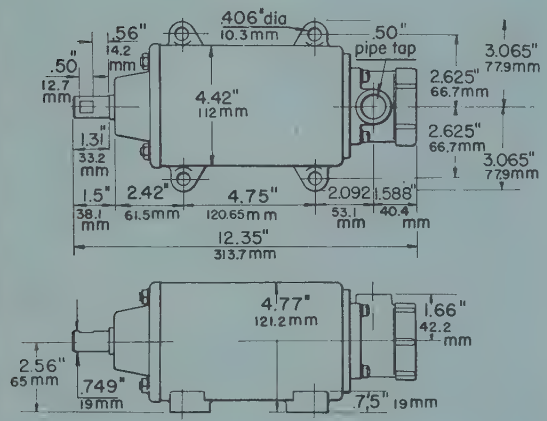
Type W — Rigid heavy duty cast iron base mounting type housing, with ¾" diameter shaft supported by heavy duty ball bearings for direct coupling, pulley, spur gear or chain and sprocket drive. Provided with conduit junction box with ½" N.P.T. opening suitable for flexible conduit which may be located in any one of four positions at right angle to shaft. Designed for locations which impose more or less severe operational conditions, such as mechanical abuse or water spray, as are found in paper mills and in chemical plants where cleaning up by hose is frequent. Housing is gasket sealed.

Approx. Torque: Starting 3.0 oz-in
Running 3.0 oz-in at 1000 rpm
Approx. Weight 24.5 lbs. (11.1 kgs.)
For Voltage Responsive Systems Specify 758W
Cat. No. 758-9910002
For Frequency Responsive Systems Specify 758WF

All dimensions are approximate.



Type E with Terminal Box and Special Binding Post Assembly Removed


.406" dia
10.3 mm
.56"
14.2 mm
.50"
12.7 mm
.50"
pipe tap
3.065"
77.9 mm
2.625"
66.7 mm
4.42"
112 mm
2.625"
66.7 mm
3.065"
77.9 mm
1.31"
33.2 mm
1.5"
38.1 mm
2.42"
61.5 mm
4.75"
120.65 mm
2.092
53.1 mm
1.588"
40.4 mm
12.35"
313.7 mm
4.77"
121.2 mm
1.66"
42.2 mm
2.56"
65 mm
.749"
19 mm
.75"
19 mm

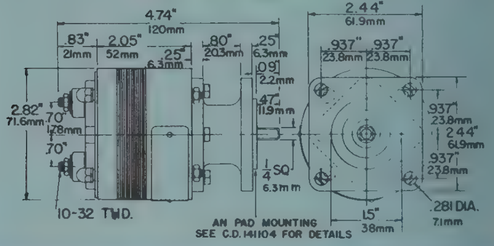
BASE MOUNTING

Type E — Similar to Type W but listed by Underwriters' Laboratories, Inc. for use in hazardous locations Division 1 (vapors exist continuously), Class 1, Group D and Class 2, Groups F and G. Class 1, either natural gas or the vapors from lacquer solvents, acetone, alcohols and petroleum derivatives, such as gasoline. Class 2, Groups F and G covers carbon black, coal or coke dust and grain dust, etc.

For Voltage Responsive Systems Specify 758E
Cat. No. 758-9910001

For Frequency Responsive Systems Specify 758EF

Type KB3


4.74"
120 mm
.83"
21 mm
2.05"
52 mm
.25"
6.3 mm
.80"
20.3 mm
.25
6.3 mm
.09
2.2 mm
.47
11.9 mm
2.82"
71.6 mm
.70"
17.8 mm
.70"
1/4 SQ
6.3 mm
10-32 THD.
AN PAD MOUNTING
SEE C.D. 141104 FOR DETAILS
2.44"
61.9 mm
.937"
23.8 mm
.937"
23.8 mm
.937
23.8 mm
2.44"
61.9 mm
.937
23.8 mm
1.5"
38 mm
.281 DIA.
7.1 mm

PAD MOUNTING (AN)

Type KB3 — Square aluminum mounting pad with a dust proof aluminum alloy housing and ¼″ square drive dog. Mounting pad in accordance with military drawing AND 20005. Two binding posts for electrical connections.

Approx. Torque: Starting 2.0 oz-in
Running 2.0 oz-in at 1000 rpm
Approx. Weight .... 2.5 lbs. (1.13 kgs.)

For Voltage Responsive Systems
Specify 758KB3
Cat. No. 758-9907000

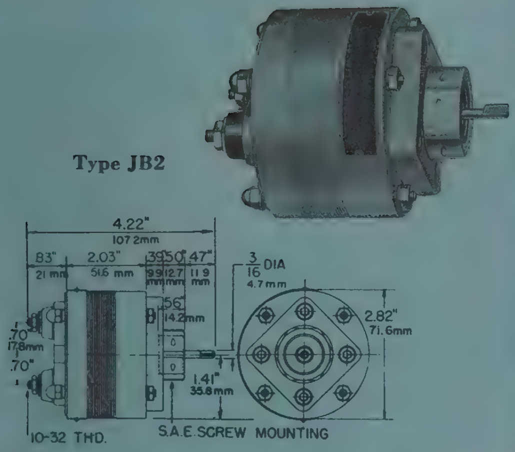
For Frequency Responsive Systems
Specify 758KBF3
Cat. No. 758-9911000

Type KB6 — Same as Type KB3 except method of electrical connection. Instead of binding posts, generator has a binding post cover box and an AN plug connector type AND 10066-12S-3P. The mating socket connector is an AN 3106-12S-3S (not supplied).

For Voltage Responsive Systems
Specify KB6
No. 758-9908000

For Frequency Responsive Systems
Specify 758KBF6

All dimensions are approximate.


Type JB2
4.22"
107.2mm
.83"
21 mm
2.03"
51.6 mm
.39
9.9 mm
.50"
12.7 mm
.47"
11.9 mm
3/16 DIA
4.7mm
.56"
14.2mm
2.82"
71.6mm
.70"
17.8mm
.70"
1.41"
35.8mm
10-32 THD.
S.A.E. SCREW MOUNTING

SCREW MOUNTING (S.A.E.)

Type JB2 — Standard S.A.E. 7/8″ screw type steel mounting with 3/16″ solid drive dog. Dustproof aluminum alloy housing with two binding posts for electrical connection. Chiefly used on Diesel and gas engines where a standard S.A.E. screw type tachometer outlet is available.

Approx. Torque: Starting 2.0 oz-in
Running 2.0 oz-in at 1000 rpm
Approx. Weight ....2.5 lbs. (1.13 kgs.)
Cat. No. 758-9905000

For Voltage Responsive Systems
Specify 758JB2
Cat. No. 758-9905000

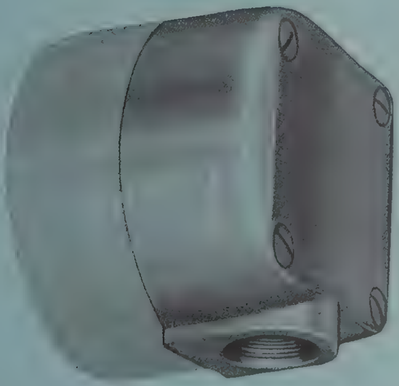
For Frequency Responsive Systems
Specify 758JBF2

Type JB5 — Same as Type JB2 except method of electrical connection. Instead of binding posts, generator has a binding post cover box and an AND 10066-12S-3P. The mating socket connector is AN 3106-12S-3S (not supplied).

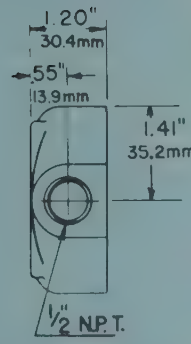
For Voltage Responsive Systems
Specify 758JB5
Cat. No. 758-9905001

For Frequency Responsive Systems
Specify 758JBF5

ACCESSORIES



Binding Post Conduit Box


1.20"
30.4mm
.55"
13.9mm
1.41"
35.2mm
1/2" N.P.T.

BINDING POST CONDUIT BOX

Available for Model 758 Types AB, JB2 and KB3 and similar "F" type Generators. Conduit Box has ½″ N.P.T. opening suitable for flexible conduit connections. Specify Part No. 143157.

Specify 9933-0143157

All dimensions are approximate.

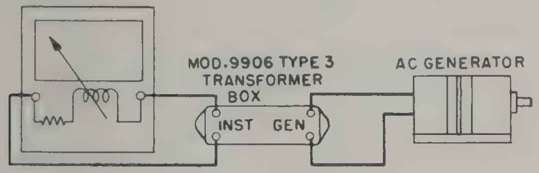
MODEL 758 A-C TACHOMETER GENERATOR — CHARACTERISTICS

SPECIFICATION	TYPE AB	TYPE W	TYPE E	TYPE KB3	TYPE KB6	TYPE JB2	TYPE JB5
Voltage Output at 1000 RPM	10 Volts, ±1% Open Circuit	10 Volts, ±1% Open Circuit	10 Volts, ±1% Open Circuit	10 Volts, ±1% Open Circuit	10 Volts, ±1% Open Circuit	10 Volts, ±1% Open Circuit	10 Volts, ±1% Open Circuit
Permissible Current Drain	150 MA	150 MA	150 MA	150 MA	150 MA	150 MA	150 MA
Frequency at 900 RPM	60 Hz Sine Wave	60 Hz Sine Wave	60 Hz Sine Wave	60 Hz Sine Wave	60 Hz Sine Wave	60 Hz Sine Wave	60 Hz Sine Wave
Allowable End Play	.005″	.005″	.005″	.005″	.005″	.005″	.005″
Max. Operating Temperature	250°F	250°F	250°F	250°F	250°F	250°F	250°F
Internal Res. at 25°C: Standard Unit F-Type Unit*	100 Ω ±1% 32 Ω ±20%	100 Ω ±1% 32 Ω ±20%	100 Ω ±1% 32 Ω ±20%	100 Ω ±1% 32 Ω ±20%	100 Ω ±1% 32 Ω ±20%	100 Ω ±1% 32 Ω ±20%	100 Ω ±1% 32 Ω ±20%
Stator	8 Poles	8 Poles	8 Poles	8 Poles	8 Poles	8 Poles	8 Poles
Insulation	← INSULATION CLASS 105 →						
Rotor	Alnico V, 8 Poles	Alnico V, 8 Poles	Alnico V, 8 Poles	Alnico V, 8 Poles	Alnico V, 8 Poles	Alnico V, 8 Poles	Alnico V, 8 Poles
Bearings	Ball	Ball	Ball	Ball	Ball	Ball	Ball
Accuracy	±1%	±1%	±1%	±1%	±1%	±1%	±1%
Temperature Coefficient: Standard Unit F-Type Unit*	← 0.2% PER 10°C CHANGE → ← NOT COMPENSATED, 0.4% PER 10°C CHANGE →						
E.M.F. Linearity	← On All Types — Dependent Upon Load and Speed →						
Min. Top Speed	500	500	500	500	500	500	500
Max. Top Speed	5000	5000	5000	5000	5000	5000	5000
Starting Torque	2-3 oz. ins.	2-3 oz. ins.	2-3 oz. ins.	2-3 oz. ins.	2-3 oz. ins.	2-3 oz. ins.	2-3 oz. ins.
Running Torque at 1000 RPM	2-3 oz. ins.	2-3 oz. ins.	2-3 oz. ins.	2-3 oz. ins.	2-3 oz. ins.	2-3 oz. ins.	2-3 oz. ins.
Weight	2.9 lbs.	24.5 lbs.	24.5 lbs.	2.5 lbs.	2.6 lbs.	2.5 lbs.	2.6 lbs.
Length	4.39	12.35	12.35	4.74	5.11	4.22	4.59
Width	2.82	6.13	6.13	2.82	2.82	2.82	2.82
Height	2.97	4.77	4.77	2.82	3.38	2.82	3.38
Mounting	Base	Base	Base	Sq. AN Pad	Sq. AN Pad	SAE ⅞″ Screw	SAE ⅞″ Screw
Enclosure	Dust Res.	Spray Res.	Explosion Proof	Dust Res.	Dust Res.	Dust Res.	Dust Res.
Shaft Diam.	½″	¾″	¾″	¼″ Sq.	¼″ Sq.	3/16″	3/16″
Shaft Connection	Direct, Geared or Belted	Direct, Geared or Belted	Direct, Geared or Belted	Direct	Direct	Direct	Direct
Shaft Length	1″ (w/.87 Flat)	1½	1½	.47	.47	.47	.47
Electrical Connection	10-32 Studs	½″ N.P.T., 10-32 Studs	½″ N.P.T., 10-32 Studs	10-32 Studs	AN Plug Conn.	10-32 Studs	AN Plug Conn.

**F Type generators for use in frequency responsive systems only. Any of the above types can be supplied for use in frequency systems.*

A-C FREQUENCY RESPONSIVE SYSTEMS

Frequency Responsive Tachometer Systems consist of a d-c indicator or recorder, a frequency responsive network which may be contained in the recorder or a separate transformer box, and an a-c tachometer generator of either the conventional or bearingless form. In the speed region of 500 to 5,000 rpm, either form of generator may be used. Above 5,000 rpm the bearingless generator is recommended. (See Page 20 for description of frequency responsive network.)



Circuit Diagram — AC Frequency Responsive

A-C SPEED DIFFERENTIAL MEASUREMENTS

The Weston Speed Differential Tachometer is an electrical device which measures the difference of two speeds. The instrument may be calibrated in terms of RPM Differential, Feet Per Minute-Draw, Inches Per Minute-Shrink, etc. One or more additional indicators or recorders may be connected to one of the generators and calibrated in terms of production rate.

There are several accepted methods of measuring speed differential. The first and most basic is to arrange the two d-c generators so that their output voltages are in opposition. By connecting a d-c instrument between the two generators, a measurement of their voltage output difference may be read directly in terms of RPM Differential or whatever unit of measurement is required. Instruments may be connected in parallel to the generators to measure the speeds.

Another method of measuring speed differential is by the use of two a-c generators and frequency responsive networks arranged so that their outputs feed into a differential indicator or recorder.

Typical of the operations to which this system can be applied is that of indicating the RPM difference between two engines driving a common shaft through a fluid drive. A tachometer generator is coupled to the driving shaft of each engine. Two wires from each generator are connected to either a differential indicator or a transformer box depending upon whether a D-C or an A-C Frequency Responsive System is being used. When a Frequency Responsive System is used, four wires are connected from the box to the differential indicator so that during operation of the engines the instrument will then show the difference between their speeds. An additional instrument calibrated in RPM may be connected in the circuit to give the actual speed of either or both engines.

BEARINGLESS A-C GENERATORS – MODEL 758

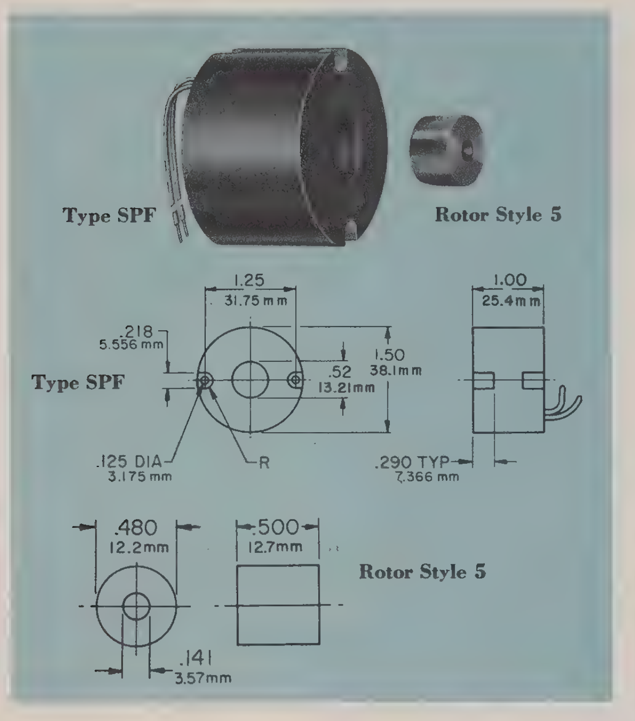
Bearingless Tachometer Generators are a-c generators of the most basic form consisting only of a permanent magnet rotor and a stator. Designed primarily for the use by Original Equipment Manufacturers, these extremely rugged and dependable generators have no bearings or brushes and therefore, require absolutely no maintenance. Because they are impervious to oil, grease and relatively high temperatures they may be installed in inaccessible areas, such as gear boxes, which permit the saving of space and the reduction of costs. They have extremely low torque burdens of less than one ounce-inch and are capable of speeds up to 100,000 rpm.

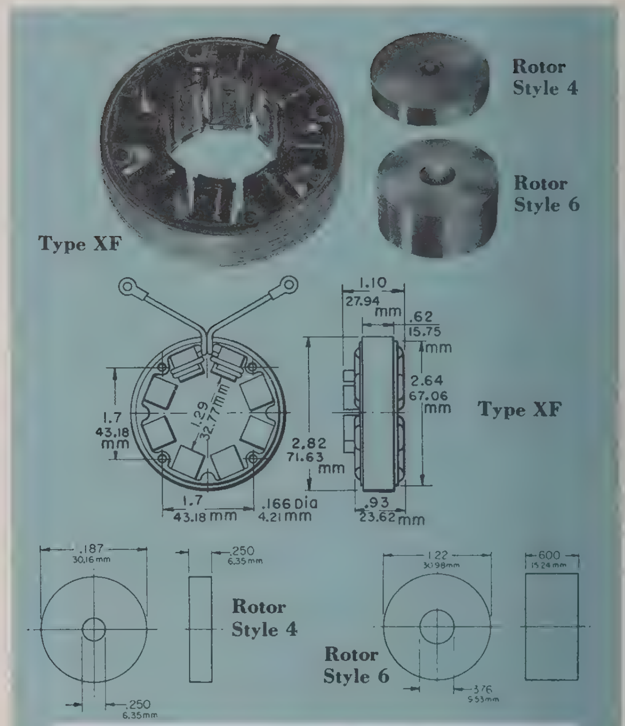
In general, when using a bearingless generator the frequency responsive approach should be used. Since this system is solely dependent upon the frequency output of the generator, voltage variations caused by reductions in the magnetic strength of the rotor due to handling, poor alignment of stator and rotor, or axial travel of the rotor with respect to the stator will not affect the overall accuracy.

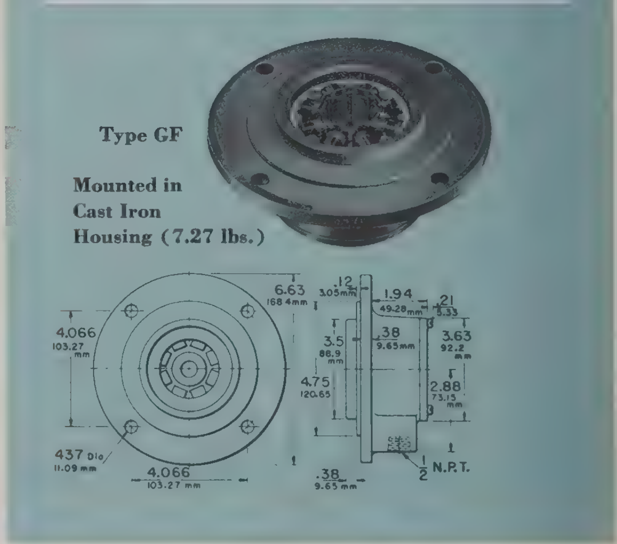
Weston Bearingless Tachometer Generators can be supplied with two different forms of mounting. The most basic forms are the Types XF and SPF mountings in which the stator may be mounted within the equipment without the necessity of any protective housing. The Type GF form of mounting consists of the Type XF stator mounted within a flange type of cast iron housing which is bolted on the outside case of the equipment. Three standard forms of rotors are available and the selection of the proper rotor should be on the basis of the speed involved.

(Continued)

BEARINGLESS A-C GENERATORS – MODEL 758 *(Continued)*


Type SPF
Rotor Style 5
1.25
31.75 mm
1.00
25.4 mm
.218
5.556 mm
Type SPF
.52
13.21 mm
1.50
38.1 mm
.125 DIA
3.175 mm
R
.290 TYP
7.366 mm
.480
12.2mm
.500
12.7mm
Rotor Style 5
.141
3.57mm


Rotor Style 4
Rotor Style 6
Type XF
1.10
27.94 mm
.62
15.75 mm
1.29
32.77mm
1.7
43.18 mm
2.64
67.06 mm
Type XF
2.82
71.63 mm
1.7
43.18 mm
.166 Dia
4.21 mm
.93
23.62 mm
.187
30.16 mm
.250
6.35 mm
Rotor Style 4
.250
6.35 mm
1.22
30.98mm
.600
15.24 mm
Rotor Style 6
.376
5.53mm


Type GF
Mounted in Cast Iron Housing (7.27 lbs.)
6.63
168.4mm
.12
3.05mm
1.94
49.28mm
.21
5.33
4.066
103.27 mm
3.5
88.9 mm
.38
9.65mm
3.63
92.2 mm
4.75
120.65
2.88
73.15 mm
.437 Dia
11.09 mm
4.066
103.27 mm
.38
9.65 mm
1/2 N.P.T.

Model 758 Types XPF86 and GF86 generators designed to meet MIL-S-901 high shock as required by specification MIL-T-16049.

Generator Speed RPM	No. Stator Poles	Rotor Style	Internal Res. at 25C ohms ±20%	Model 758*	
				Type	Type
500 - 20,000	8	6	32	GF-86**	XF-86**
20,000 - 40,000	4	4	15	GF-44**	XF-44**
40,000 - 100,000	2	5	40		SPF-25

*For example, if an application involved the installation of the bearingless generator within a gear box in which the speed to be measured was 15,000 rpm, the proper bearingless generator would be the Model 758 type XF-86.
**Can be supplied potted; this is known as Type XPF or GPF at $7.50 list additional.

Model	Type	Catalog No.
758	GF86	758-9912002
758	XF86	758-9989002
758	SPF25	758-9989001
758	GF44	
758	XF44	

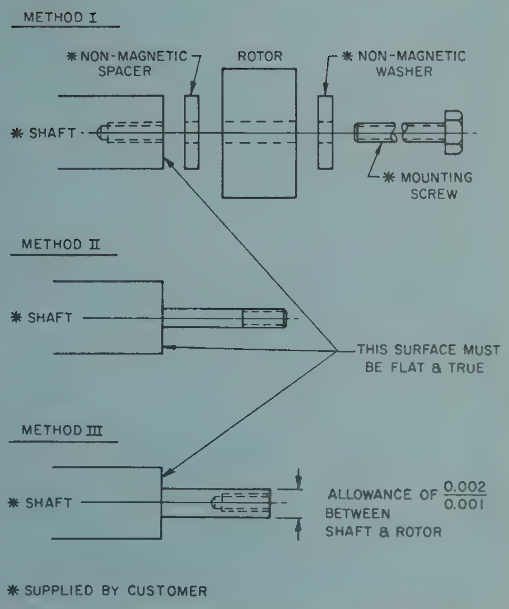
All dimensions are approximate.

ROTOR INSTALLATION

The rotor of the generator unit should be mounted to the true center of the shaft with extreme care, particularly in higher speed applications. A few representative methods are shown, but other methods can be used.

The relatively small inertia of the rotor makes it possible to secure it to the shaft with a right hand thread regardless of the direction of rotation. It is recommended that a steel screw having an SAE thread be used to permit maximum tightening.

NOTE: Do *not* press fit the rotor to the shaft, or the rotor will shatter because of the brittle nature of the magnetic rotor material.


METHOD I
✱ NON-MAGNETIC SPACER
ROTOR
✱ NON-MAGNETIC WASHER
✱ SHAFT
✱ MOUNTING SCREW
METHOD II
✱ SHAFT
THIS SURFACE MUST BE FLAT & TRUE
METHOD III
✱ SHAFT
ALLOWANCE OF 0.002/0.001 BETWEEN SHAFT & ROTOR
✱ SUPPLIED BY CUSTOMER

MODEL 758 BEARINGLESS A-C GENERATORS — CHARACTERISTICS

MODEL & TYPE	HOUSING	STATOR (NO. OF POLES)	ROTOR (STYLE NO.)	VOLT OUTPUT AT 1000 RPM (OPEN CIRCUIT)	FREQUENCY AT 1800 RPM (CYCLES/SEC.)	STATOR RESISTANCE (OHMS)	SPEED RANGE
758 GF 86 758 GPF 86*	CAST IRON	8	6	10 ±1%	120	32 ±20%	500-20,000 RPM
758 XF 86 758 XPF 86*	NONE	8	6	10 ±1%	120	32 ±20%	500-20,000 RPM
758 GF 44 758 GPF 44*	CAST IRON	4	4	2.0 $^{+3\%}_{-0\%}$	60	15 ±20%	20,000-40,000 RPM
758 XF 44 758 XPF 44*	NONE	4	4	2.0 $^{+3\%}_{-0\%}$	60	15 ±20%	20,000-40,000 RPM
758 SPF 25	NONE	2	5	1.5 $^{+5\%}_{-0\%}$	30	40 ±20%	40,000-100,000 RPM

*These are the same as GF or XF series except stator winding is potted (similar to SPF type).

FREQUENCY RESPONSIVE NETWORKS

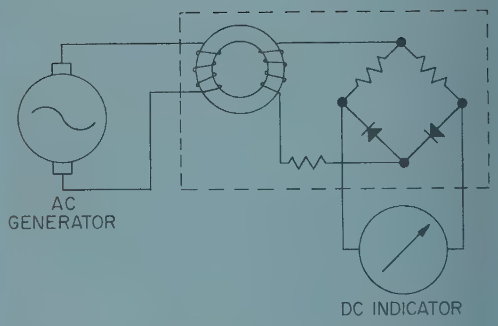
A Frequency Responsive Network is, as its name implies, a device that responds to the input frequency rather than the input voltage. Inasmuch as the frequency of an a-c tachometer generator has an exact relationship to its RPM, better accuracy of the overall tachometer system can be had by using a frequency responsive network.

This system is especially advantageous when using the bearingless tachometer generator. When this generator is used in a frequency responsive system the transient voltage variations introduced by the radial and axial travel of the rotor with respect to its stator are not evidenced in the final scale reading. There are two basic types of frequency responsive circuits. The selection will depend upon the application.

Speed Measurement: This circuit consists of: a-c tachometer generator, Model 758*; a transformer box, Model 9906 containing the frequency responsive network; and an indicator or recorder. Variations of this basic circuit may be had incorporating such features as, multiple ranges and the use of a reference signal for critical accuracy adjustment.

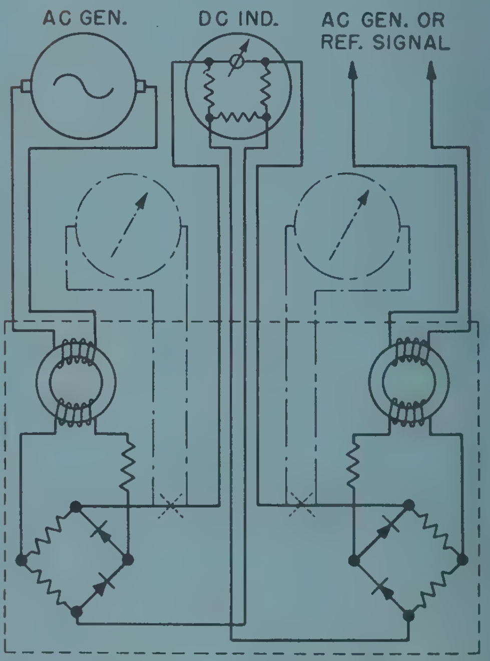
Electrically Suppressed Zero Speed Measurement: Consists of: one a-c tachometer generator, Model 758*; a reference signal, such as 110 volts 60 cycles; a transformer box, Model 9906 Type 4, containing two frequency responsive networks; and an indicating or recording device. The upper 10% or more of the full scale speed may be expanded over the complete scale of the instrument. Variations of this basic circuit may be had such as multiple ranges including both zero left and suppressed zero, and the use of a reference signal for critical accuracy adjustment.

Differential Measurement: This circuit is similar to that used for suppressed zero measurement. It consists of: two a-c tachometer generators, Model 758*; a transformer box, Model 9906 Type 4, containing two frequency responsive networks; and a differential indicator or recorder.



Circuit Diagram — Model 9906

SPEED MEASUREMENT

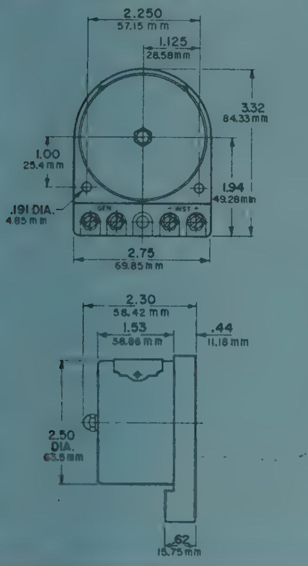


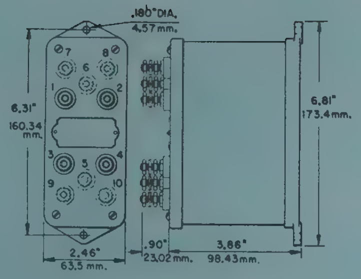
Circuit Diagram — Model 9906 Type 4

SUPPRESSED ZERO OR DIFFERENTIAL SPEED MEASUREMENT

**Note: A-C generators having low resistance windings (approx. 32 ohms), must be used in frequency responsive systems. Those having such windings are identified by the letter "F" in their type number. For example, the low resistance type of explosion proof generator would be the Model 758 Type EF.*

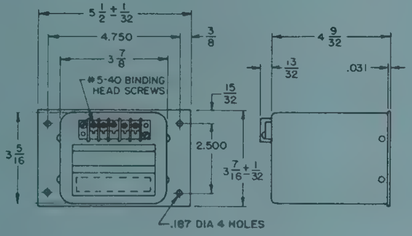
Model 9906 Type 1


2.250
57.15 mm
1.125
28.58mm
3.32
84.33mm
1.00
25.4mm
.191 DIA.
4.85mm
1.94
49.28mm
2.75
69.85mm
2.30
58.42 mm
1.53
38.86 mm
.44
11.18mm
2.50 DIA.
63.5mm
.62
15.75mm


.180" DIA.
4.57mm.
6.31"
160.34 mm.
6.81"
173.4mm.
2.46"
63.5 mm.
.90"
23.02mm.
3.86"
98.43mm.

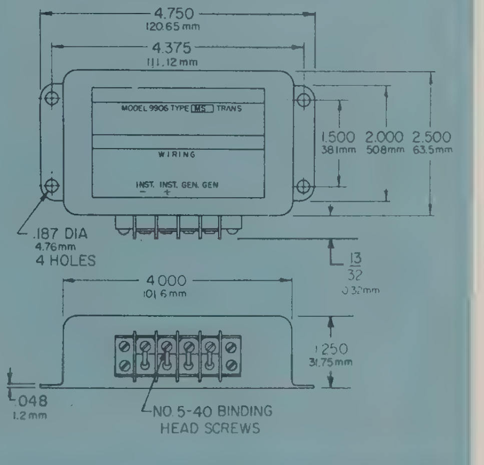
Model 9906 Type 3 or 4

Model 9906 Type MS


$5\frac{1}{2} \pm \frac{1}{32}$
4.750
$\frac{3}{8}$
$3\frac{7}{8}$
#5-40 BINDING HEAD SCREWS
$4\frac{9}{32}$
$\frac{13}{32}$
.031
$\frac{15}{32}$
$3\frac{5}{16}$
2.500
$3\frac{7}{16} \pm \frac{1}{32}$
.187 DIA 4 HOLES

Model 9906 Type C

WHERE MORE THAN 5 TERMINALS ARE REQUIRED A SECOND TERMINAL STRIP IS ADDED IN DOTTED AREA


4.750
120.65mm
4.375
111.12mm
MODEL 9906 TYPE MS TRANS
WIRING
INST. INST. GEN. GEN
1.500
381mm
2.000
508mm
2.500
63.5mm
.187 DIA
4.76mm
4 HOLES
13/32
10.32mm
4.000
101.6mm
1.250
31.75mm
.048
1.2mm
NO. 5-40 BINDING HEAD SCREWS

All dimensions are approximate.

Model 9906 is available as Type 1, 3, 4, MS or C. Types 1, MS and 3 are standard frequency responsive transformer boxes used for indication and/or control. Type 4 is used for differential or suppressed zero indication.

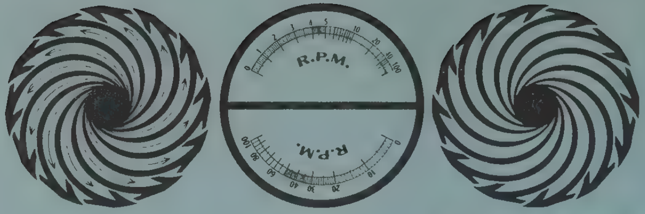
Type 1, the smaller unit is available with a maximum of five (5) binding posts and is normally used for one (1) indicator system.
Model 9906 — Type 1

Type 3 is a larger unit which can be supplied with a maximum of 10 binding posts and normally is used where multiple indication or indication and control are required.
Model 9906 — Type 3

Type 4 contains two (2) single systems and is supplied on individual negotiation.
Model 9906 — Type 4

Type C is similar to Type 3 electrically, and is physically lighter in weight and slightly smaller in size.
Model 9906 — Type C

Model 9906 type MS Network Box designed to meet MIL-S-901C High Shock in accordance with MIL-T-16049B with active parts potted to resist environments. The box has a 4 connection terminal strip and rheostat externally adjustable.
Model 9906 Type MS



A-C AND D-C TACHOMETER INDICATORS

Weston Tachometer Indicators are D-C or Rectifier type A-C voltmeters which have been calibrated in terms in keeping with their application such as RPM, Minutes Baking Time, Miles Per Hour, Gallons Per Minute, Cycles Per Second, etc. The use of sensitive meter mechanisms eliminates the requirement for specially calibrated connecting leads, unless unusually long distances are encountered. One, two or up to 25 indicators may be operated from the same generator with all giving direct indication simultaneously.

All indicators are normally supplied with single range zero left indication, however, they may be supplied zero right, suppressed zero or with multiple ranges. The D-C indicators may also be supplied zero center when required. All are equipped with zero correctors and are temperature compensated. The indicators are dust and moisture resistant and with the exception of the Models 961, 961-RD and 961-FD, are enclosed in steel cases which afford protection from external magnetic fields.

Full Scale Accuracy of Tachometer Indicators

1%	1½%	2%	2½%
269-DC	269-RD	961-DC	962-RD
271-DC	271-RD	....	....
273-DC	273-RD	....	....
956-DC	956-RD	....	....
954-DC	954-RD	....	....
921-DC	921-RD	....	....
	901-RD	....	....

The indicators on the following pages are only typical of those available. Almost any Weston indicating instrument can be provided as a tachometer indicator.

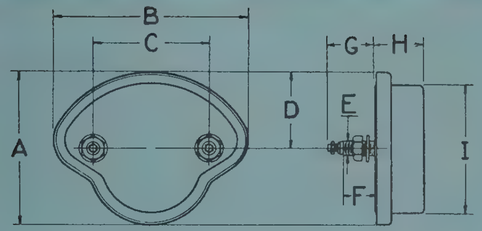
400
200
0
200
400
R.P.M.
ASTERN
AHEAD
WESTON

Model 269, 271 or 273

SWITCHBOARD (FAN SHAPED)

Models 269 (d-c), 269-RD (a-c) and 269-FD (Frequency Responsive); 271 (d-c) 271-RD (a-c) and 271-FD (Frequency Responsive) 273 (d-c), 273-RD (a-c) and 273-FD (Frequency Responsive): These surface type instruments are ideal for most indicating purposes. They are enclosed in drawn steel cases with long easily read scales and are similar in construction, varying only in size and scale length.

Model	Scale Length	Approx. Wt.
269 269-RD 269-FD	118° 4.0″	1.5 lbs. (.68 kgs.)
271 271-RD 271 FD	125° 5.8″	3.8 lbs. (1.72 kgs.)
273 273-RD 273-FD	130° 7.3″	5.0 lbs. (2.27 kgs.)



	Model -	273	271	269
A	Ins.	7 13/32	6¼	4 7/16
	Mm.	188	159	113
B	Ins.	9 5/16	7⅞	5⅝
	Mm.	237	200	143
C	Ins.	5¼	5¼	3 11/32
	Mm.	133	133	85
D	Ins.	3 23/32	3⅛	2 7/32
	Mm.	94	79	56
E	Ins.	½	½	⅜
	Mm.	12.7	12.7	9.5
F	Ins.	27/32	27/32	⅞
	Mm.	21.4	21.4	22.2
†G	Ins.	1½	1½	1 11/32
	Mm.	38.1	38.1	34.1
H	Ins.	2 1/16	1¾	1 13/32
	Mm.	52	45	36
I	Ins.	6 13/32	5 7/32	3 23/32
	Mm.	163	133	95

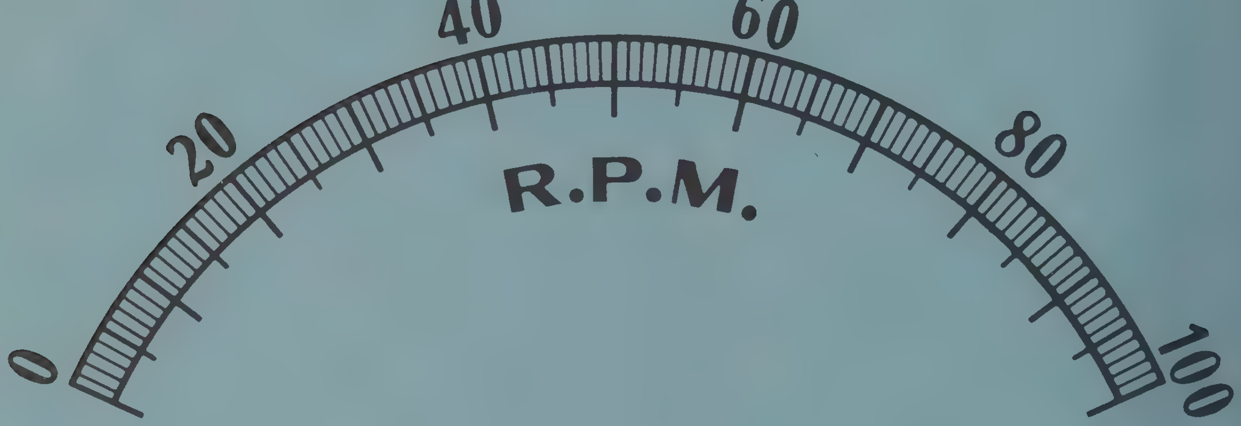
†Also available with 3½″ studs on Models 273 and 271; and 2⅞″ studs on Models 269 and 267 at an additional charge.

EXPANDED SCALE

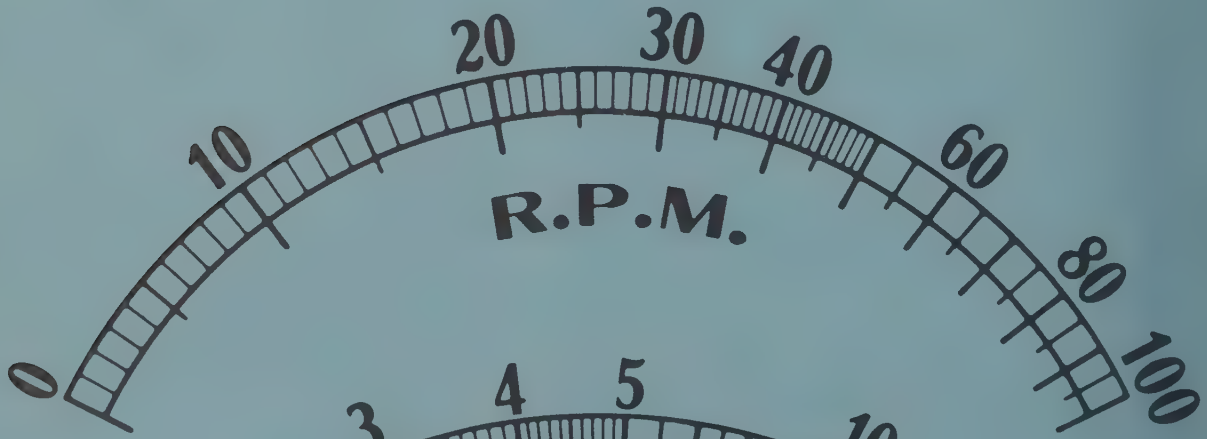
Model 273-D: Special indicators with expanded scales which accurately indicate speeds as low as 1 RPM without pointer oscillation. The Model 750 D-C generator can be directly driven for these low speeds, however, uniform speed of driving is essential for steady indication. They can be supplied with linear divided scales or with expanded scales. See page 24.

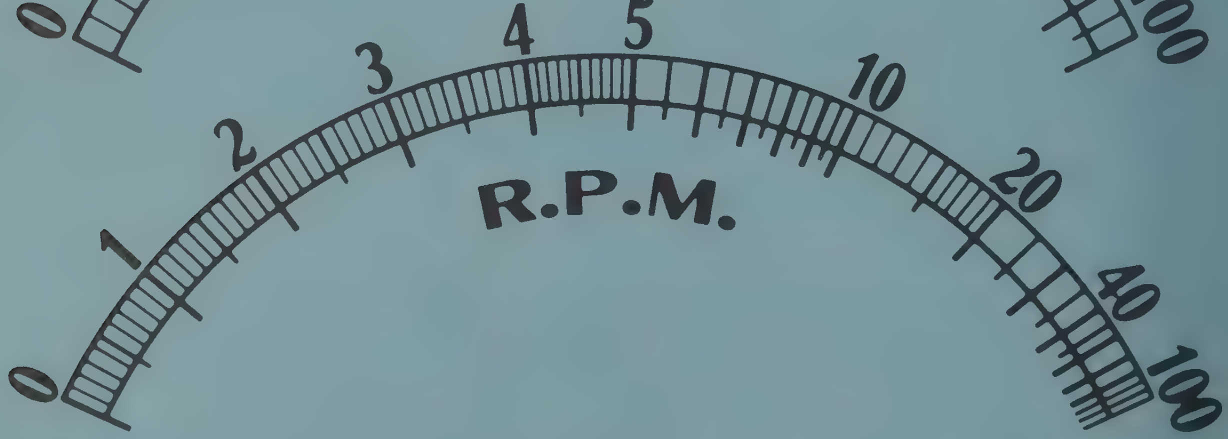
Model	Scale Length	Approx. Wt.
273-D	130° 7.3″	5.0 lbs. (2.27 kgs.)

Typical Full Size Scale – MODEL 273

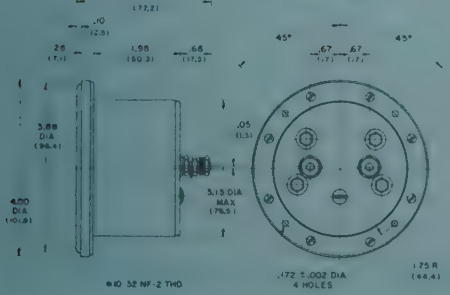

0
20
40
60
80
100
R.P.M.

Typical Full Size Expanded Scales – MODEL 273


0
10
20
30
40
60
80
100
R.P.M.

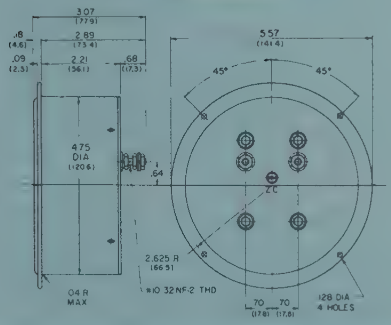

0
1
2
3
4
5
10
20
40
100
R.P.M.

Model 956 or 956-RD


3.04
(77.2)
.10
(2.5)
.28
(7.1)
1.98
(50.3)
.68
(17.3)
45°
.67
(17)
.67
(17)
45°
3.88
DIA
(98.4)
.05
(1.3)
4.00
DIA
(101.6)
3.13 DIA
MAX
(79.5)
#10 32 NF-2 THD
.172 ±.002 DIA
4 HOLES
1.75 R
(44.4)

1
2
3
4
5
6
7
8
9
10
R.P.M.

Model 954 or 954-RD


3.07
(77.9)
.18
(4.6)
2.89
(73.4)
.09
(2.3)
2.21
(56.1)
.68
(17.3)
5.57
(141.4)
45°
45°
4.75
DIA
(120.6)
.64
ZC
2.625 R
(66.5)
.04 R
MAX
#10 32 NF-2 THD
.70
(17.8)
.70
(17.8)
.128 DIA
4 HOLES

LONG SCALE (250°)

Models 956 (d-c), 956-RD (a-c) and 956-FD (Frequency Responsive); 954 (d-c), 954-RD (a-c) and 954-FD (Frequency Responsive):

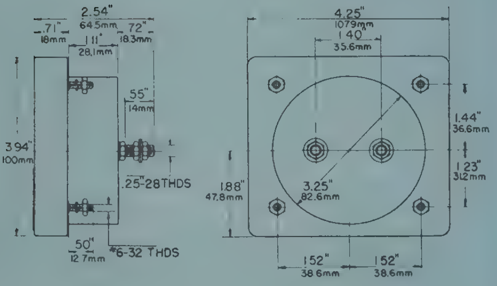
Specially designed for gasoline or diesel, marine, railroad or stationary engines, and also many other applications where a long scale is required. They are enclosed in black metal cases which are flush mounting with a wide flange.

Model	Scale Length	Approx. Wt.
956 956-RD 956-FD	5.4″	2 lbs. (.9 kgs.)
954 954-RD 954-FD	8.2″	2 lbs. (.9 kgs.)

All dimensions are approximate.

200
400
600
0
800
R. P. M.
SPEED RATIO 2:1
USE WITH MODEL 768 GENERATOR
WESTON

Model 961


2.54"
64.5mm
.71"
18mm
.72"
18.3mm
1.11"
28.1mm
.55"
14mm
3.94"
100mm
.25-28THDS
.50"
12.7mm
#6-32 THDS
4.25"
107.9mm
1.40"
35.6mm
1.44"
36.6mm
1.23"
31.2mm
1.88"
47.8mm
3.25"
82.6mm
1.52"
38.6mm
1.52"
38.6mm

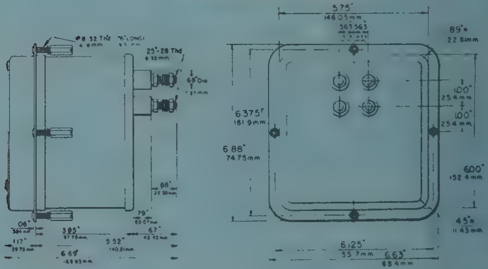
PANEL (4″ Size)

Models 961 (d-c), and 961-FD (Frequency Responsive): Flush type instruments mounted in bakelite cases. Rectangular in shape, they are particularly suitable for small panels. When ordering, state panel material and thickness.

Model	Scale Length	Approx. Wt.
961 961-FD	3.17″	1 lb. (.45 kgs.)

25
50
75
100
125
150
YARDS
PER MINUTE

Model 919, 921
or 921-RD


5.75"
146.05mm
.89"
22.6mm
.25"-28 Thd
.68" Dia
6.375"
161.9mm
6.88"
174.75mm
1.00"
25.4mm
1.00"
25.4mm
6.00"
152.4mm
.45"
11.43mm
.88"
.79"
.06"
3.85"
.67"
.117"
5.52"
6.69
6.125"
6.63"

SWITCHBOARD (6″ Size)

Models 921 (d-c), 921-RD (a-c) and 921-FD (Frequency Responsive): Rectangular instruments contained in drawn steel cases with black finish in either flush or surface mounting. Large dial openings with distinct scale calibration and markings make reading easy even from a distance. Internal illumination can be provided at a nominal surcharge.

Model	Scale Length	Approx. Wt.
921 921-RD 921-FD	90° 5.12″	7 lbs. (3.2 kgs.)

RATIO METERS (d-c)

Model 919: The Model 919 is a rectangular instrument contained in a six inch drawn steel case which matches the Model 921 line of instruments.

Model	Scale Length	Approx. Wt.
919	90° 5.1″	6.0 lbs. (2.70 kgs.)

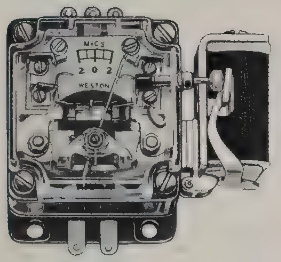
All dimensions are approximate.

RELAYS

alarm / over or under
speed trip / control

Magnetic Contact Type (Sensitrol)

WESTON
SENSITROL
RELAY
0
1
MILLIAMPS


MICS
2 0 2
WESTON

LCCA Type

200
400
600
800
DEGREES
FAHRENHEIT

40
60
80
100
MICROAMPERES
WESTON

For more information on Weston relays write for Catalog 02-110.

WESTON INSTRUMENTS DIVISION
WESTON INSTRUMENTS, INC.
614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
a Schlumberger company

WESTON®

TACHOMETERS / GENERATORS

PRICE LIST
03 - 101

Effective Date
November 16, 1970

All Prices Subject to Change Without Notice and are F. O. B. Factory, Newark, N.J.

Model 750 — Direct Current Generators

Type	Catalog Number	Price
Type A	Catalog Number 750-9901000s	$129.25
Type K3	Catalog Number 750-9903000s	156.00
Type E	Catalog Number 750-9905001s	290.50
Type W	Catalog Number 750-9905002s	236.75
Type J2	Catalog Number 750-9906000s	156.00
Type M2	Catalog Number 750-9906001s	156.00
Type J2R	Catalog Number 750-9906002s	156.00

Model 750 Type K30, Internal Generator for Types E and W

Catalog No. 750-9905000s Price $156.00

Model 758 — Alternating Current Generators

Type	Description	Price
Type AB	For Voltage Responsive Systems Specify 758 AB Catalog Number 758-9901000 s	$ 91.50
	For Frequency Responsive Systems Specify 758 ABF Catalog Number 758-9901001 s	91.50
Type JB2	For Voltage Responsive Systems Specify 758 JB2 Catalog Number 758-9905000 s	107.50
Type JB5	For Voltage Responsive Systems Specify 758 JB5 Catalog Number 758-9905001 s	114.00
Type KB3	For Voltage Responsive Systems Specify 758 KB3 Catalog Number 758-9907000 s	91.50
Type KB6	For Voltage Responsive Systems Specify KB6 Catalog Number 758-9908000 s	98.00
Type E	For Voltage Responsive Systems Specify 758 E Catalog Number 758-9910001 s	252.75
Type W	For Voltage Responsive Systems Specify 758 W Catalog Number 758-9910002 s	199.00

NOTE: Any of the above Model 758 A.C. Generators can be provided for use in Frequency Responsive Systems at no change in price. Add "F" to the type designation, as "Type KB3F", and specify "For Use in Frequency Responsive System".

Model 758 — Bearingless A-C Generators

Type	Catalog Number	Price
GF86	758-9912002s	$91.50
XF86	758-9989002s	48.45
SPF25	758-9989001s	43.15
GF44	------------------	91.50
XF44	------------------	48.45

"s" Denotes Stock Item

Model 9933 Barbour Stockwell Gear Boxes

Item	Price
Ratio 1:10 Step-Up — Cat. No. 9933-9900001s	Price $ 53.50 Net
Ratios between 1:10 and 1:40 Step Up	63.50 Net
Ratios between 10:1 Step-Down and 1:10 Step-Up	127.00 Net

Model 9933 Binding Post Conduit Box

Item	Price
For Model 750, Types A, J2 and K3, Catalog Number 9933-0143156s	Price $ 6.25
For Model 758, Types AB, JB2 & KB3, Catalog Number 9933-0143157s	Price $ 6.25

Model 9999 Brush Replacement Kit

For all Model 750 D.C. Generators,
Catalog Number 9999-249302s Price $ 9.00

Model 9906 Transformer Boxes

Type	Price
Type 1	Price $ 77.50
Type 3	77.50
Type 4	190.00
Type C	65.50
Type MS	97.50

Tachometer Indicators

Model	Price
Model 269	Price $ 80.00
Model 269RD	115.00
Model 269FD	80.00
Model 271	115.00
Model 271RD	150.00
Model 271FD	115.00
Model 273	130.00
Model 273RD	165.00
Model 273FD	130.00
Model 273D	170.00
Model 919	265.00
Model 921	146.00
Model 921RD	165.00
Model 921FD	146.00
Model 954	105.00
Model 954RD	140.00
Model 956	98.00
Model 956RD	130.00
Model 961	60.00
Model 961FD	60.00

NOTE: Tachometer Indicator prices above are list prices for quantities of 25 or more. For prices applicable to quantities of less than 25, please contact nearest Weston Sales Office or authorized Sales Service Center.

WESTON INSTRUMENTS DIVISION
WESTON INSTRUMENTS, INC.
614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
a Schlumberger company

WESTON®

SELENIUM PHOTOVOLTAIC CELLS

Models 594 and 856

PRICE LIST
03-204
Effective
April 2, 1970
SUPERSEDES ISSUE
DATED 12/1/68

All Prices Subject to Change Without Notice and are F.O.B. Factory, Newark, N.J. 07114

			QUANTITY NET PRICES				
Model	Cat. No.	Type	1–9	10–24	25–49	50–99	100–199
856	9901012	GG	$35.75	$33.25	$29.50	$25.25	$23.50
856	9902004	GGV	59.75	56.00	50.00	44.00	40.50
856	9901007 s	RB	34.50	32.50	28.25	24.25	22.75
856	9902005	RBV	58.25	55.25	49.25	43.50	40.00
856	9901005 s	RR	32.00	30.25	26.50	22.75	21.00
856	9902001 s	RRV	56.00	52.75	47.50	42.00	38.50
856	9901011 s	YR	29.75	28.00	24.50	21.00	19.50
856	9901003	GB	27.25	25.75	22.75	19.25	18.00
856	9901013	BB	29.50	23.75	20.50	17.75	16.50
856	9901010	YY	29.75	28.00	24.50	21.00	19.50
856	9901009	YG (RBI)	45.25	43.00	37.75	32.75	30.25
856	9903001**	YR	29.75	28.00	24.50	21.00	19.50
594	9901014	GG	34.75	32.00	29.75	26.50	24.50
594	9901015	GGV	58.50	54.50	50.50	45.50	42.00
594	9901010	RB	33.25	31.50	27.25	23.75	22.25
594	9901016	RBV	57.25	54.00	48.25	43.00	39.25
594	9901006 s	RR	31.00	29.00	25.50	21.50	20.50
594	9901011 s	RRV	55.00	51.50	46.20	41.00	40.25
594	9901005	YR	28.75	26.75	23.75	20.25	19.00
594	9901004	GB	26.00	24.50	21.50	18.50	17.50
594	9901017	BB	28.00	22.25	19.50	16.75	16.00
594	9901002	YY	28.75	26.75	23.75	20.00	19.00

**Supplied with .24" studs.

SPECIAL FEATURES FOR MODEL 856/594

SYMBOL (SEE CIRCULAR)	SURCHARGE				
	1–9	10–24	25-49	50–99	100–199
*L		$ 9.00	$ 8.00	$ 6.50	$ 6.00
*O		11.00	9.75	8.25	8.00
*S	Price on Application	22.00	19.00	16.50	15.25
V		24.25	22.50	21.25	20.00
**C (M856)		19.50	18.00	17.00	16.00
C (M594)		9.25	8.50	8.00	7.25
***I		9.00	8.50	7.25	6.50
Q		25.25	24.00	23.00	21.25
594 Prong Type Terminals		3.25	2.75	2.25	1.75
Weatherproof housing	$43.75 Single Cell Type for Model 856 Cell				

*Normally supplied in pairs.
**Unit comes in Bakelite Type 5 Housing.
***Inconel coating for either glass, quartz or viscor filters.

NOTE: PRICES APPLY TO SINGLE CELL.

WESTON INSTRUMENTS DIVISION
WESTON INSTRUMENTS, INC.
614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
a Schlumberger company

Printed in U.S.A.

WESTON®

SELENIUM PHOTOVOLTAIC CELLS

Models 594 and 856

PRICE LIST
03-204
Effective
April 2, 1970
SUPERSEDES ISSUE
DATED 12/1/68

All Prices Subject to Change Without Notice and are F.O.B. Factory, Newark, N.J. 07114

Model	Cat. No.	Type	QUANTITY NET PRICES 1–9	10–24	25–49	50–99	100–199
856	9901012	GG	$35.75	$33.25	$29.50	$25.25	$23.50
856	9902004	GGV	59.75	56.00	50.00	44.00	40.50
856	9901007 s	RB	34.50	32.50	28.25	24.25	22.75
856	9902005	RBV	58.25	55.25	49.25	43.50	40.00
856	9901005 s	RR	32.00	30.25	26.50	22.75	21.00
856	9902001 s	RRV	56.00	52.75	47.50	42.00	38.50
856	9901011 s	YR	29.75	28.00	24.50	21.00	19.50
856	9901003	GB	27.25	25.75	22.75	19.25	18.00
856	9901013	BB	29.50	23.75	20.50	17.75	16.50
856	9901010	YY	29.75	28.00	24.50	21.00	19.50
856	9901009	YG (RBI)	45.25	43.00	37.75	32.75	30.25
856	9903001**	YR	29.75	28.00	24.50	21.00	19.50
594	9901014	GG	34.75	32.00	29.75	26.50	24.50
594	9901015	GGV	58.50	54.50	50.50	45.50	42.00
594	9901010	RB	33.25	31.50	27.25	23.75	22.25
594	9901016	RBV	57.25	54.00	48.25	43.00	39.25
594	9901006 s	RR	31.00	29.00	25.50	21.50	20.50
594	9901011 s	RRV	55.00	51.50	46.20	41.00	40.25
594	9901005	YR	28.75	26.75	23.75	20.25	19.00
594	9901004	GB	26.00	24.50	21.50	18.50	17.50
594	9901017	BB	28.00	22.25	19.50	16.75	16.00
594	9901002	YY	28.75	26.75	23.75	20.00	19.00

**Supplied with .24" studs.

SPECIAL FEATURES FOR MODEL 856/594

SYMBOL (SEE CIRCULAR)	SURCHARGE 1–9	10–24	25-49	50–99	100–199
*L		$ 9.00	$ 8.00	$ 6.50	$ 6.00
*O		11.00	9.75	8.25	8.00
*S	Price on Application	22.00	19.00	16.50	15.25
V		24.25	22.50	21.25	20.00
**C (M856)		19.50	18.00	17.00	16.00
C (M594)		9.25	8.50	8.00	7.25
***I		9.00	8.50	7.25	6.50
Q		25.25	24.00	23.00	21.25
594 Prong Type Terminals		3.25	2.75	2.25	1.75
Weatherproof housing	$43.75 Single Cell Type for Model 856 Cell				

*Normally supplied in pairs.
**Unit comes in Bakelite Type 5 Housing.
***Inconel coating for either glass, quartz or viscor filters.

NOTE: PRICES APPLY TO SINGLE CELL.

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THERMOELEMENTS

AND

COPPER OXIDE RECTIFIERS

WESTON INSTRUMENTS, INC.
WESTON - NEWARK DIVISION
614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
a Schlumberger Company

WESTON THERMOELEMENTS . . .

VACUUM
Type V (Contact Heater)
Type V-I (Insulated Heater)

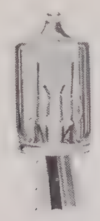


FIG. 1

BRIDGE
—Type B—

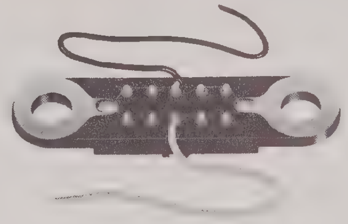


FIG. 2

COMPENSATED
—Type C—

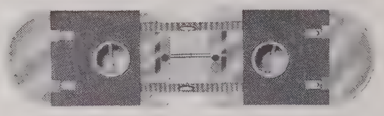


FIG. 3

MODEL 9937 THERMOELEMENTS UNMOUNTED

Weston Thermoelements are used with sensitive d-c instruments for accurate measurement of a-c current in terms of rms, practically independent of frequency and wave form. Their low impedance makes them particularly useful in low energy circuits, permitting measurements impracticable with electrodynamometers or moving iron types of instruments.

They are designed to produce a d-c voltage proportional to the heating effect of current to be measured (I^2R). Freedom from frequency errors is achieved by constructing the heater to minimize skin effect and by eliminating the possibility of parasitic currents in the thermocouple. Output voltage is as high as possible, consistent with accuracy, reproducibility and overload capacity.

Types of Thermoelements

To provide the greatest flexibility of use, Weston Thermoelements are supplied in four types: V, V-I, B and C. The name applied to each type is descriptive of its principal feature.

Type V (Vacuum, Contact Heater)—This simplest type of vacuum thermoelement consists of a heater to which the thermocouple is directly attached. It is contained in a highly evacuated glass envelope to minimize heat loss. The heater impedance is low, resulting in a minimum voltage drop across the heater. They are available mounted or unmounted in ranges of 1.5 to 500 milliamperes, and for use on d-c or a-c of any frequency. Unmounted elements (Fig. 1) are provided with 2 inch color coded wire leads, yellow for the heater terminals; red and black for + and — output. Mounted thermoelements are furnished in round bakelite cases. See Fig. 4.

Open circuit generated voltage at rated heater current is approximately 5 millivolts d-c. Frequency and overload characteristics depend on range . . . some elements suitable for frequencies to 300 megacyles and for overloads beyond 100%. Refer to Table I, Page 4 for frequency characteristics and other data.

Type V-I (Vacuum, Insulated Heater)—Insulated heater vacuum thermoelements are very similar to the standard contact type described above except that the thermocouple is attached to the heater with an insulating bead. In order to obtain rapid response, the bead must be very small, must have good thermal conductivity and yet must act as an electrical insulator at high temperature. All Weston insulated heater vacuum thermoelements will withstand a test of 100 volts a-c between heater and thermocouple terminals for 15 seconds. Electrostatic capacity between the heater and the thermocouple through the insulating bead is less than 2 micromicrofarads.

These insulated thermoelements are frequently found desirable in special types of research work to avoid grounding the heater circuit through the thermocouple. In general, however, the potential between the heater and the thermocouple should be kept at a minimum, preferably not over a few volts in order to avoid circulating currents at high frequency as well as stresses in the insulating bead due to any considerable potential difference.

Insulated heater vacuum thermoelements are identified by green insulation on the heater leads; leads from the thermocouple are red and black for + and — output. They are available in ranges of 1.5 to 500 ma and, in general, have exactly the same ratings as the contact type with regard to output voltage, and as to frequency and overload characteristics. Refer to Table I for details.

Type B (Bridge)—Consists of thermal junctions arranged in Wheatstone bridge connection. Ranges from 100 to 800 milliamperes, a-c only. Current to be measured passes through the thermocouples and raises their temperature proportional to I^2R. A typical

Dimensional Diagrams on Page 7

Round Case

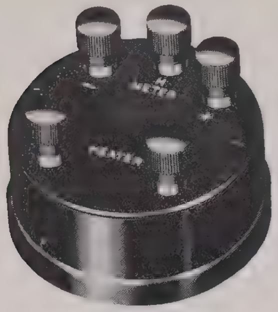


FIG. 4

Rectangular Case

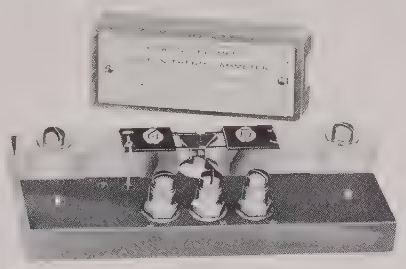


FIG. 5

Small Rectangular Case

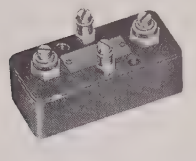


FIG. 6

MODEL 9997 THERMOELEMENTS MOUNTED

unmounted bridge type thermoelement is shown in Fig. 2. A number of thermocouples, depending upon the range, are symmetrically disposed around the bridge. The total d-c voltage generated across points of zero a-c potential will be N/2 times the voltage output of each thermocouple, where N is the number of thermocouples used. Thus a high ratio of output voltage to current input is achieved.

Special cold end compensation is not required by virtue of the construction wherein pins common to the cold ends of the thermocouples are moulded into a bakelite base. The resistance of each arm of the bridge is carefully balanced to minimize the introduction of a-c potential into the measuring element.

These thermoelements can be provided unmounted as in Fig. 2, in round bakelite cases, Fig. 4, or small rectangular cases, Fig. 6.

Voltage output, frequency and overload characteristics shown in Table II, Page 4.

Type C (Compensated)—Single heater, single thermocouple construction arranged for open air operation. Ranges up to 20 amperes a-c or d-c; 20 amperes and above a-c only. Sufficient temperature rise of the thermocouple thermo junction in contact with the heater is obtained at these ranges to generate approximately 12 millivolts d-c output at rated current through the heater. Fig. 3 shows the Type C thermoelement, and Fig. 5 shows the thermoelement in a rectangular case with the cover removed.

The term "compensated" applies to the elimination of the cold end temperature variation effect. Thermocouple voltage generation is a function of two factors:

1—The materials used in the thermocouple (relation of each in thermoelectric series).

2—The temperature differential between the thermo junction and the cold ends.

Since the voltage generated is to be a function of the temperature rise of the heater at the thermo junction only, some means must be provided to maintain a constant relationship between the heater and the cold ends of the thermocouple. This constant temperature difference is achieved by terminating the cold ends of the thermocouple to two copper strips constructed thermally equivalent to the heater wire. The strips are placed in thermal contact, through thin mica electrical insulators, with the terminal blocks and thus with the heater ends. Variations in ambient temperature will thus affect the cold ends of the thermocouple and the heater to the same degree and the temperature differential will be a function of current through the heater only.

Generated voltage on all ranges is approximately 12 millivolts and overload capacity about 50%.

Round bakelite cases for ranges up to 20 amperes are normally provided. Above this value rectangular cases are standard. Rectangular cases are also available for the lower ranges. Replacement thermoelements for self-contained Weston panel type thermo instruments are supplied mounted on an interchangeable instrument base.

For frequency characteristics and other data see Table III, Page 4.

Cases

Thermoelement cases and bases for use on the higher current ranges are molded of low loss bakelite to minimize heating in the presence of high frequency fields.

All round cases, refer to Fig. 4, are provided with five terminals clearly marked for a-c, line d-c instrument connections. One terminal is marked "H" for ground or shield connection and is internally connected to one side of the heater. Insulated posts are used in all types for d-c circuits and for a-c in Types V, V-I and B. All Type C thermoelements use metal posts for a-c circuits.

Rectangular cases, supplied for Type C thermoelements 15 amperes and above and for lower ranges when required. Refer to Fig. 5.

Small rectangular case—where space is at a premium, for Type B and C thermoelements up to 10 amperes. Refer to Fig. 6.

Unmounted elements are normally supplied only in the vacuum Types V or V-I. For unmounted Types B or C correspondence is required with our Parts Service Department.

Characteristics on Page 4

WESTON THERMOELEMENTS • • •

Adjustment

Unadjusted—Thermoelements in round or rectangular cases may be furnished unadjusted and having output characteristics within the limits given in the tabulations below.

Group I—These thermoelements are furnished in round or rectangular cases. They are used with Weston Panel Instruments when the thermoelement is mounted some distance from the instrument. These instruments and thermoelements are furnished adjusted as a unit and are not interchangeable. Therefore orders for thermoelements must be associated with the instrument order.

Instruments and thermoelements can be adjusted, under some conditions, for use with leads having a resistance up to 20 ohms. Correspondence is necessary. Leads are not normally supplied.

When ordering replacement thermoelements, the instrument must be returned to the factory to be adjusted to the new thermoelement; otherwise unadjusted thermoelements will be supplied.

Heating elements can be supplied on order at extra cost made interchangeable with both a specific output resistance and specific output to an instrument of adjusted sensitivity and resistance. Correspondence is invited.

General Suggestions for Use

Mounting Positions—Thermoelements must be mounted in the position indicated on the nameplate, failure to do this will impair the accuracy. When not specified, position is no factor.

Leads—Adjustment is made as indicated under "Adjustment" above in terms of specific leads. Deviations from this factor as to resistance will introduce errors. Shielded or twisted leads should be used to reduce the possibility of induced current pick-up.

Maximum Energy Utilization—When used with special instruments or devices note that the maximum energy transfer to the output circuit is obtained when d-c circuit resistance is equal to the thermocouple resistance.

Induced Currents—As added precautions to eliminate induced R.F. currents in thermocouple circuits, the following factors should be considered.

(a) Connect thermoelement in circuit to a point as near ground potential as possible.
(b) Provide grounding of shielded cable.
(c) Chokes may be used in d-c circuits. In this instance resistance must be as low as possible and must be specified.

Vacuum Thermoelements—When used unmounted avoid application of any external source of heat to the thermoelement such as strong light or other radiations.

Approximate Characteristics

TABLE I

Type V (Contact Heater) Type V-I (Insulated Heater)

Range Rated ma (1)	Heater Ohms ± 10%	Approximate Heater Drop At Rated Current, mv	Couple Ohms ± 10% Types V	Couple Ohms ± 10% Types V-I	Maximum Safe Heater Current, ma	Freq. For 2% Error, Megacycles (3)
1.5	1365	2000	7.5	10	3.2	300
2	750	1500	7.5	10	5.0	300
2.5	475	1200	6	10	6.2	300
4	95	380	9	10	9.0	300
5	80	450	6	10	10.0	300
7.5	40 (2)	300	6	10	16	300
10	24 (2)	270	6	10	25	300
15	13	195	6	10	40	300
20	8.1	170	6	10	50	300
25	6.6	175	6	10	62	300
30	5.8	175	3	5	75	300
37.5	4.6	170	3	5	85	300
50	3.3	165	3	5	115	300
75	1.5	100	3	5	170	200
100	1.03	100	3	5	220	200
150	0.66	100	3	5	320	150
200	0.50	90	3	5	420	75
250	0.39	100	3	5	510	75
300	0.33	100	3	5	610	50
400	0.25	100	3	5	800	35
500	0.20	100	3	5	1000	35

Notes: (1) Rated heater current will produce 5 to 6 mv d-c at couple terminals.
(2) Subject to ±15%.
(3) Error due to skin effect only.

TABLE III

Type C (Compensated)

Range Rated Amps (1), (2)	Heater Ohms (approx.)	Freq. For 2% Error, Megacycles (3)
0.5	0.83	150
0.75	0.43	75
1.0	0.26	75
1.25	0.21	75
1.5	0.13	75
2.0	0.12	50
2.5	0.096	50
3.0	0.081	40
3.5	0.057	65
4.0	0.050	65
5.0	0.040	65
7.5	0.027	65
10.0	0.020	65
12.0	0.017	65
15.0	0.013	65
20.0	0.010	65
25.0	0.008	65
50.0	0.004	65

Max. Safe Current — All Ranges 1.5 times rated.

Notes: (1) Rated heater current will produce 12 to 15 mv d-c at couple or meter terminals.
(2) All couples, 0.35 ohms approximate.
(3) Error due to skin effect only.

TABLE II—Type B (Bridge)

Range Ma	Resistance Ohms ±10%	Open Circuit E.M.F. D-C Millivolts	Max. Safe Current Ma	Freq. for 2% Error Megacycles*	Range Ma	Resistance Ohms ±10%	Open Circuit E.M.F. D-C Millivolts	Max. Safe Current Ma	Freq. for 2% Error Megacycles*
100	5.2	6.5	400	300	250	1.8	9.5	750	200
115	5.2	7.0	400	300	300	2.4	13.5	1000	200
120	5.2	7.5	400	300	400	1.3	9.5	1200	100
125	5.2	8.2	400	300	500	1.3	14.8	1200	100
150	5.2	11.9	400	300	750	0.75	14.3	1800	65
200	2.7	10.9	600	200	800	0.75	16.2	1800	65

** Error due to skin effect only.*

Model 9956

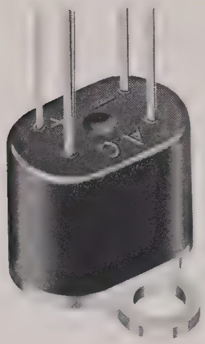


FIG. 7

Rectifier

Twice Enlarged

Copper Oxide Rectifiers are used in conjunction with permanent magnet moving coil instruments for the measurement and control of alternating current. By virtue of their relatively high efficiency and the high sensitivity available in d-c instruments, measurements of a-c current at ranges as low as 30 microamperes are practical.

These Rectifiers are designed for long term stability, permanence, and high efficiency. While the exact rectification process is not completely defined, the necessary characteristics can be achieved by careful manufacture and selection of basic materials. Copper oxide units are preferable to selenium or other metallic rectifiers, for instrument applications, because of their lower resistance. The lower voltage characteristic is of no consequence since this type of application usually involves only a few hundred millivolts.

Construction

All Weston Rectifier units, regardless of disc diameter and arrangement, are assembled in a moisture proof bakelite housing illustrated in Fig. 7. Leads approximately 1.7″ long are provided to permit soldering to circuit connections without undue heating of disc surfaces. Mounting is readily accomplished by means of a 0.125″ dia. (#5) screw.

Discs

Rectifier units are available in the following three disc sizes to provide the best characteristics for a given requirement: 0.20″ diameter, 0.13″ diameter, 0.08″ diameter.

All discs are carefully manufactured from special copper, and for each lot a particular oxidizing and annealing cycle is determined to give optimum characteristics. Oxidization is done in electric furnaces where accurate control produces the desired temperature cycles. After the cuprous oxide film is produced on one surface, that surface, as well as the rear of the disc, is covered with a thin layer of pure gold sputtered on. The gold film provides both excellent conduction and protection.

Discs are individually tested to determine their characteristics with regard to forward and back current, and other pertinent data. Acceptable discs are then mounted in bakelite housings and aged for 30 days at elevated temperature.

Disc Arrangement

The most broadly used rectifier unit is one having four discs disposed in conventional Wheatstone bridge arrangement. This type is known as the 4 Disc Full Bridge. Many other combinations are possible; correspondence is invited relative to special problems.

Rectifier Characteristics

Copper Oxide Rectifier characteristics are related to the circuit in which they are used and are so complex as to defy accurate classification. Therefore, only approximate data may be illustrated as a guide to their performance.

D-C Current

While the rectifier discs are classed as unidirectional conductors, they are not entirely so, thus with application of an alternating voltage, current will flow in both directions. The reverse (leakage) current however is considerably smaller than the forward value. The curves of Fig. 8 illustrate this characteristic for the three standard disc sizes.

Current-Resistance

The current-resistance relation of a rectifier is essentially logarithmic over its usable forward conducting range. Curves of Fig. 10 are typical for a 4 Disc Full Bridge. Load resistance shown applies across d-c terminals of bridge.

Rating

The rating of Weston Rectifier units is given in terms of maximum current and voltage. These values should not be exceeded. See Table IV, Page 7.

Efficiency

Rectification ratio, or efficiency, is a function of current density in the disc. From the standpoint of a complete unit in a circuit it would also depend on the disc arrangement and size. Fig. 9 shows the rectification ratio typical of a 4 Disc Full Bridge arrangement.

WESTON COPPER OXIDE RECTIFIERS . . .

Applications

The use of instrument type Copper Oxide Rectifiers is extensive where high sensitivity (low energy) alternating current measurements and related functions are desired. Probably the greatest use is in voltmeters for electronic circuit applications where instrument loading is of prime importance. Volume level indicators or "DB" meters for program monitoring and similar uses are rectifier types. Surge protection can be achieved with these rectifiers, and their non-linear characteristics utilized in such circuits as modulation bridges.

However, it must be emphasized that the application of any rectifier unit must be done on an individual design basis. Many characteristics are to be considered and related as to make each problem unique in itself. This applies, to a lesser degree, for replacement units because of the non-uniformity of each unit to another.

Limitations

Inherent in the use of rectifier units must be the consideration of the effects of temperature, frequency and wave form.

Temperature Effects—Ambient temperature variations are a major consideration, particularly for low voltage measuring applications. Changes in measuring characteristics are of a relatively high order and difficult to compensate.

The principal effects of temperature are to change the forward (conducting) resistance, the leakage (back) resistance, and the rectification ratio. Increases in temperature have the effect of decreasing the rectification ratio and increasing the resistance. The rate of change of resistance differs in the two directions. Compensation of these effects must be analyzed in terms of each application and are beyond the scope of this circular.

Frequency Effects—are due to the capacity in shunt with the rectifying layer of the disc. This capacity constitutes a reactance which is a function of frequency. Frequency effects are also a function of disc diameter since the smaller area rectifiers will have a low capacity. For example, the capacity of a 0.2" diameter disc is of the order of 0.01 microfarad.

Errors in conventional 0.2" diameter 4 Disc Full Bridge units are approximately ½% per 1000 cycles; the d-c output decreasing with increase in frequency.

Flat frequency response is practical up to 100 kilocycles by special application of small diameter units.

Wave Form Effects—d-c instruments or mechanisms used with rectifiers respond to the average value of the a-c wave applied. In most indicating applications the calibration is made in terms of rms of a sine wave. Deviations from a true sine wave thus introduce errors in terms of the change in form factor as related to that of a sine wave. This effect must be recognized as it can cause considerable error. For example, a rectifier type meter will read 11% high on a square topped wave.

General Suggestions for Use

Mounting—avoid physical strain or damage and excessive temperature . . . do not mount near radiating surfaces.

Wiring—always use leads provided to wire the rectifier into the circuit. One desirable method is to connect leads to a terminal strip. In soldering, proceed rapidly to avoid overheating of discs. Wire for minimum capacity effect.

Applied Voltage and Current—whenever possible operate the unit well below its maximum rating. This refers particularly to voltage rating, as high voltage results in high inverse current with consequent heating of the rectifier. However, maximum current may be drawn from the unit without damage.

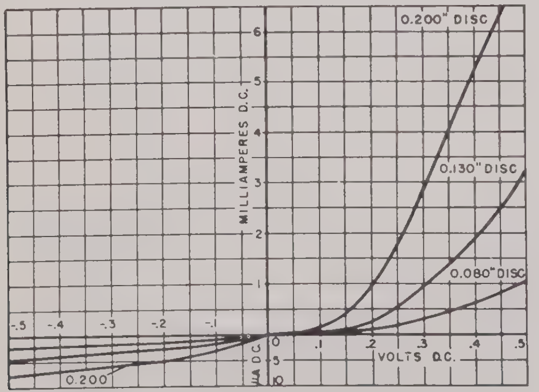


FIG. 8

Direct Current Characteristics

(Single Disc)

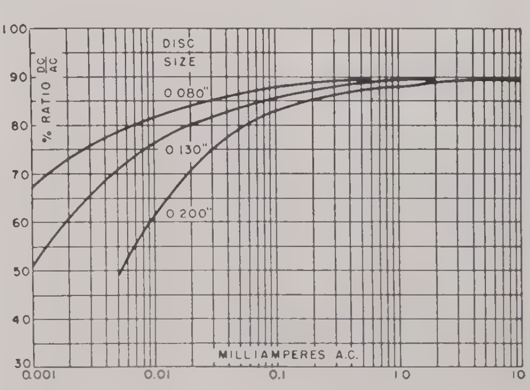


FIG. 9

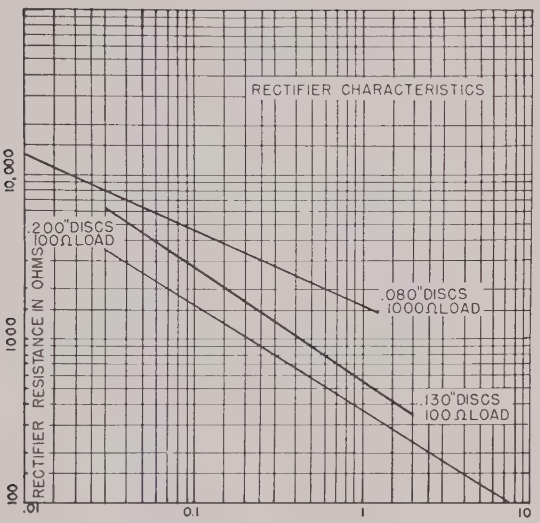
Direct and Alternate Current Ratio

(4 Disc Full Bridge)

Dimensional Diagrams on Page 7

TABLE IV

Dwg. No.	Color Code	Disc Dia.	Circuit	Max. Rating	
				A-C Volts	D-C MA
D-89367	Black	0.20″	Full Bridge	2.0	5
D-89368	Brown	0.13″	Full Bridge	2.0	2
D-89369	Tan	0.08″	Full Bridge	2.0	1



A-C Current Input in Milliamperes

FIG. 10

Current-Resistance Relation

(4 Disc Full Bridge)

Ordering Information

The following pertinent data are required to insure your receiving the proper type of equipment:

Thermoelements—Unadjusted

1. Type
2. Rated Current
3. Case

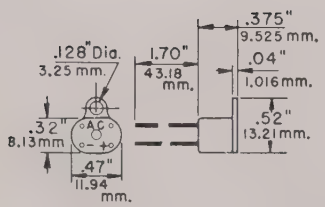
Thermoelements—Group I

1. Associated Instrument
2. Rated Current
3. Case
4. Mounting Position
5. Lead Resistance when other than 1 ft. #18 B.&S. (.014 ohm).
6. Frequency Range

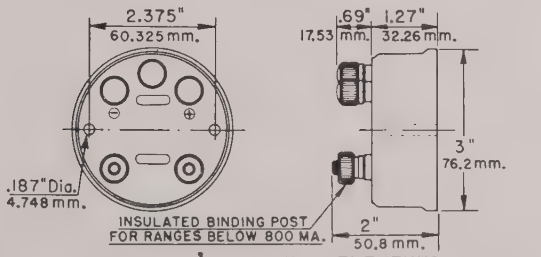
Rectifiers

1. Drawing Number
2. Color Code
3. Frequency Range
4. Circuit Data
5. Temperature Range

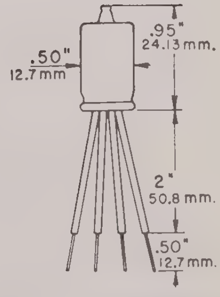
Dimensional Diagrams


.128"Dia.
3.25 mm.
1.70"
43.18 mm.
.375"
9.525 mm.
.04"
1.016mm.
.32"
8.13mm
AC
.52"
13.21mm.
.47"
11.94 mm.

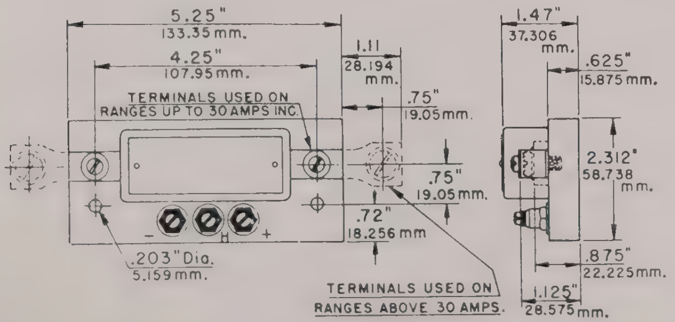
COPPER OXIDE RECTIFIERS


2.375"
60.325 mm.
.69"
17.53 mm.
1.27"
32.26 mm.
3"
76.2mm.
.187"Dia.
4.748 mm.
INSULATED BINDING POST FOR RANGES BELOW 800 MA.
2"
50.8 mm.

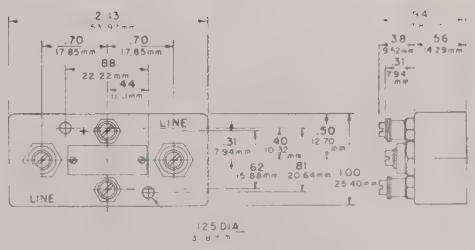
ROUND CASE FOR THERMOELEMENTS


.95"
24.13 mm.
.50"
12.7 mm
2"
50.8 mm.
.50"
12.7 mm.

TYPE V & V-I THERMOELEMENT


5.25"
133.35 mm.
4.25"
107.95 mm.
1.11
28.194 mm.
TERMINALS USED ON RANGES UP TO 30 AMPS INC.
.75"
19.05mm.
.75"
19.05 mm.
.72"
18.256 mm
.203"Dia.
5.159 mm.
TERMINALS USED ON RANGES ABOVE 30 AMPS.
1.47"
37.306 mm.
.625"
15.875 mm.
2.312"
58.738 mm.
.875"
22.225mm.
1.125"
28.575 mm.

RECTANGULAR CASE FOR THERMOELEMENTS


2.13
.70
17.85mm
.70
17.85mm
88
22.22mm
44
LINE
LINE
.31
7.94mm
40
10.32 mm
.50
12.70 mm
62
15.88mm
81
20.64mm
100
25.40mm
38
9.52mm
56
14.29mm
.31
7.94 mm
125 DIA

SMALL RECTANGULAR CASE FOR THERMOELEMEMTS

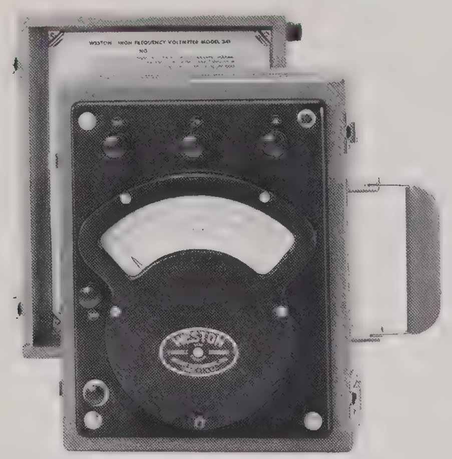
WESTON INSTRUMENTS, INC.
WESTON - NEWARK DIVISION
614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
a Schlumberger Company

PRINTED IN U.S.A. 7-66 HP

WESTON®

WESTON A-C & D-C WATTMETER, MODEL 310
WATTS
WESTON
PORTABLE STANDARD
WESTON ELECTRICAL INSTRUMENT CORP.
NEWARK, N.J., U.S.A.

PORTABLE STANDARDS



MODEL 341

Rated Accuracy 0.25% of Full Scale Value,
Horizontal Position .... Scale 5.25″ (133 mm)
Type: Electrodynamometer
(Shielded from External Magnetic Fields)

Size { 8½ x 10⅜ x 5⅞″ / 216 x 264 x 147 mm .... Approx. Weight { 11 lbs. / 5 kgs.

Power Consumption: (300/150 and 300/150/75 volt instruments) 150 volt range at 115 volts, 60 cycles—4.0 watts, 4.0 volt-amperes.

This Model 341 is a true electrodynamometer, self contained, and suitable for d-c or a-c voltage measurements. All instruments are calibrated at 25°C (77°F). A certificate provided with each instrument supplies all essential data, temperature correction factors and frequency correction factors. Locking type contact key is supplied, except for the very low range instruments where contact key is omitted.

Rated Accuracy: Instruments with all ranges of 7.5 volts and above have a rated accuracy of 0.25% of full scale value. Instruments with one or more ranges below 7.5 volts have a rated accuracy of 0.5% of full scale value.

Wave Form: True rms voltage will be measured when used on common wave form since the wave form error, in general, is exceedingly small and practically unreadable. Even under abnormal conditions, the wave form error of frequency compensated voltmeters is negligible. The standard voltmeter has small errors under abnormal conditions, but they are usually less than the rated accuracy.

Frequency: All ranges can be used from direct voltage to 125 cycles. On some ranges, it may be necessary to apply a correction factor to reduce the frequency error to a negligible value above 66 cycles. However, at nominal 60 cycles the frequency influence is negligible over the span of 54 to 66 cycles. This is less than the 0.1% maximum allowed in the ASA C39.1 standard for this frequency span.

While the general frequency span is expressed as direct voltage to 125 cycles, it must be recognized that a responsive mechanism will tend to follow the pulsations of a very low order. Thus, measurements at frequencies as low as 5 or 10 cps become impractical; the lowest frequency on which the standard instrument will function well is about 15 cps. Requirements for measurement of lower frequencies require special structures with abnormal damping. Correspondence is invited.

HIGH FREQUENCY COMPENSATED INSTRUMENTS

Instruments are available, at a surcharge, compensated for frequencies up to 2500 cps. Rated accuracy is 0.25% of full scale value.

D-C to 500 cps: As many as three ranges can be supplied self contained, providing the ratio of the highest to lowest range is not greater than 5. The lowest practical range is 7.5 volts, the highest 750 volts. The frequency error is negligible from direct voltage to 250 cps and less than 0.13% of full scale value to 500 cps.

D-C to 1000 cps: As many as three ranges can be supplied self contained, providing the ratio of highest to lowest range is not greater than 4. The lowest practical range is 10 volts, the highest 750 volts. The frequency error is negligible from direct voltage to 500 cps and less than 0.13% of full scale value to 1000 cps.

D-C to 2500 cps: Only single and double ranges can be supplied self contained. The ratio of the two ranges must not be greater than 2 to 1. The lowest practical range is 25 volts; the highest is 750 volts. A minimum of approximately 11 watts is required for single range instruments or the low range of a double range unit. The frequency error is negligible from direct voltage to 1000 cps and less than 0.13% of full scale value to 2500 cps.

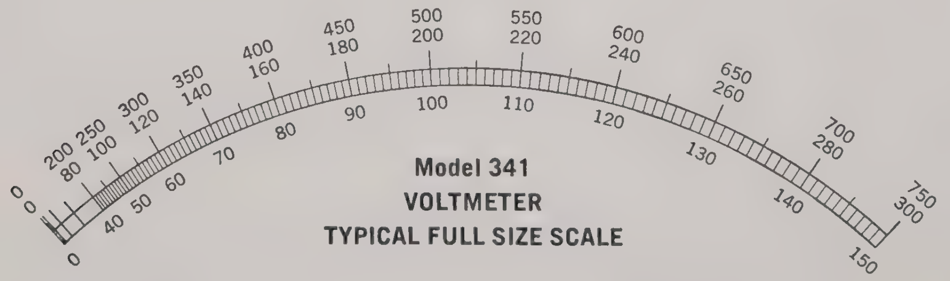
A-C AND D-C VOLTMETERS — MODEL 341

Range	Scale Div.	Approx. Sensitivity (Ma)	Approx. Res. (Ohms)
*†3/1.5	150	500	6/3
*†7.5/3	150	500	15/6
†15/7.5	150	280	54/27
30/15	150	150	200/100
75/30	150	65	1150/460
120/60	120	45	2660/1330
150/75	150	45	3340/1670
300/150	150	45	6680/3340
600/150	150	30	20000/5000
600/300	150	30	20000/10000
300/150/75	150	45	6680/3340/1670
600/300/150	150	30	20000/10000/5000
750/300/150	150	30	25000/10000/5000

*Rated accuracy 0.50% of full scale value.

†Provided with 5 foot leads. No contact key.

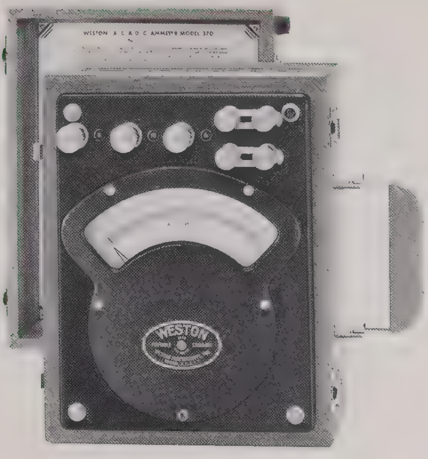
All ranges listed above are self-contained. For higher ranges, Potential Transformers or external multipliers can be used. See page 7.



Model 341
VOLTMETER
TYPICAL FULL SIZE SCALE

©1970 Weston Instruments, Inc.

Rated Accuracy 0.25% of Full Scale Value,
Horizontal Position .... Scale 5.25" (133 mm)
Type: Electrodynamometer
(Shielded from External Magnetic Fields)
Size { 8½ x 10⅜ x 5¾" / 216 x 264 x 146 mm .... Approx. Weight { 10 lbs. / 4.5 kgs.
Power Consumption: 5 ampere range at 5 amperes, 60 cycles — 4.5 watts, 4.7 volt-amperes.



MODEL 370

Designed for a-c and d-c current measurements these instruments are true electrodynamometers. All ranges above 0.5 ampere and all double range combinations are of the shunted moving coil type. All instruments are calibrated at 25°C (77°F) and have a rated accuracy of 0.25% of full scale value. A certificate provided with each instrument supplies all essential data.

They will measure true rms current on commercial wave forms since the wave form error is unreadable. Even under abnormal conditions, the wave form error is negligible.

Freguency: All ranges can be used from direct current to 125 cycles per second. The frequency error over this span is negligible.

Instruments are available, at a surcharge, compensated for frequencies up to 1000 cps for all ranges and to 2500 cps for ranges of 30 ma and higher. For the 1000 cps span, the frequency error is negligible to 500 cps and less than 0.13% of full scale value to 1000 cps. For the 2500 cps range the frequency error is negligible to 500 cps, less than 0.13% of full scale value to 1000 cps and less than 0.25% of full scale value to 2500 cps.

While the general frequency span is expressed as direct current to 125 cycles, it must be recognized that a responsive mechanism will tend to follow the pulsations of a very low order. Thus, measurements at frequencies as low as 5 or 10 cps become impractical; the lowest frequency on which the standard instrument will function well is about 15 cps. Requirements for measurement of lower frequencies require special structures with abnormal damping. Correspondence is invited.

A-C AND D-C AMMETERS — MODEL 370

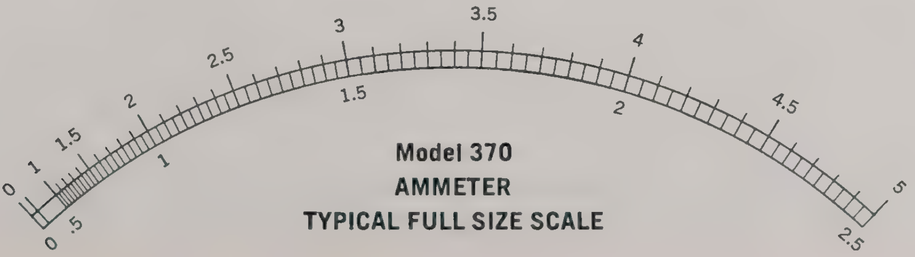
Range	Approx. Res. Ohms	Approx. Ind. mh	Scale Div.
1/.5	2.2/7.6	3.6/14.4	100
2/1	.68/2.2	.92/3.7	100
5/2.5	.18/.48	.15/.59	100
10/5	.072/.18	.037/.15	100
20/10	.033/.077	.0090/.035	100

A-C AND D-C MILLIAMMETERS — MODEL 370

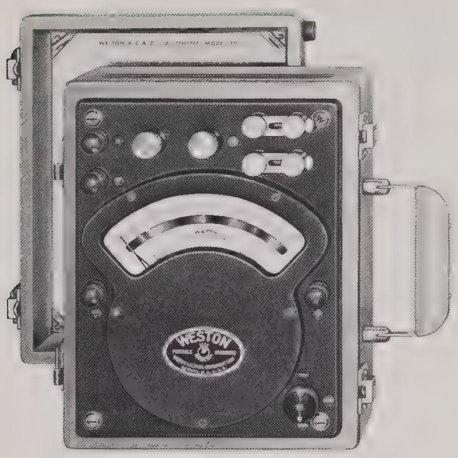
*Range	Approx. Res. Ohms	Approx. Ind. mh	Scale Div.
30/15	915/1470	2250/560	150
60/30	290/430	115/450	150
150/75	44/110	37/150	150
300/150	13/12	4.1/17	150
500/250	4.2/5.1	1.8/7.0	100

*Single range milliammeters can be supplied in ranges from 15 to 500 milliamperes.

All ranges listed above are self-contained. For higher ranges use Model 461, Types 1 or 2 or Model 327 Types 1 or 2 Current Transformers. See listing on page 7.



Model 370
AMMETER
TYPICAL FULL SIZE SCALE



MODEL 310

Rated Accuracy 0.25% of Full Scale Value,
Horizontal Position .... Scale 5.25″ (133 mm)
Type: Electrodynamometer
(Shielded from External Magnetic Fields)

Size { 8½ x 10⅜ x 5⅞″ / 216 x 264 x 147 mm .... Approx. Weight { 12 lbs. / 5.4 kgs.

Power Consumption: Forms 1 and 3—Potential Circuit at 115 volts, 60 cycles—2.9 watts, 2.9 volt-amperes. Current Circuit at 5 amperes, 60 cycles—0.81 watt, 0.95 volt-ampere.

Form 2: Potential Circuit at 115 volts, 60 cycles—4.4 watts, 4.4 volt-amperes. Current Circuit at 5 amperes, 60 cycles—3.5 watts, 3.9 volt-amperes.

Model 310 is a true electrodynamometer used for a-c and d-c power measurements. It will measure true rms values when used on commercial wave forms since the wave form error, in general, is exceedingly small and practically unreadable. Even under abnormal conditions, the wave form error of Forms 1 and 3 wattmeters is negligible. The Form 2 wattmeters have small errors under abnormal conditions but they are usually less than the rated accuracy.

All instruments are calibrated at 25°C. A certificate provided with each instrument supplies all essential data.

DESCRIPTION OF FORMS

Form 1: For general service on d-c, and on frequencies to 125 cycles. Not compensated for instrument losses, ranges based on product of normal volts and amperes. Compensated for normal temperature changes. Off position for potential circuit is provided on reversing switch.

Form 2: For low power factor service. Potential circuit power compensation is provided as ranges are usually quite low, and the power consumed by the instrument is therefore an appreciable portion of the total. Switch is provided in potential circuit to omit or include compensation. Ranges are based on 20% of the product of maximum volts and amperes. Frequency coverage same as Form 1. Special instruments, without potential circuit power compensation can be built, at a surcharge, to cover a frequency span up to 1000 cycles with the standard accuracy.

Form 3: Similar to Form 1, except that potential circuit is designed for use on higher frequencies and therefore is not so well compensated for temperature changes as Form 1. On 50 volt range, frequency coverage is from 25 to 600 cycles; 100 volts and above, 25 to 1200 cycles. Special instruments can be built, at a surcharge, to cover a frequency span up to 2500 cycles with an accuracy within ½% above 1200 cycles.

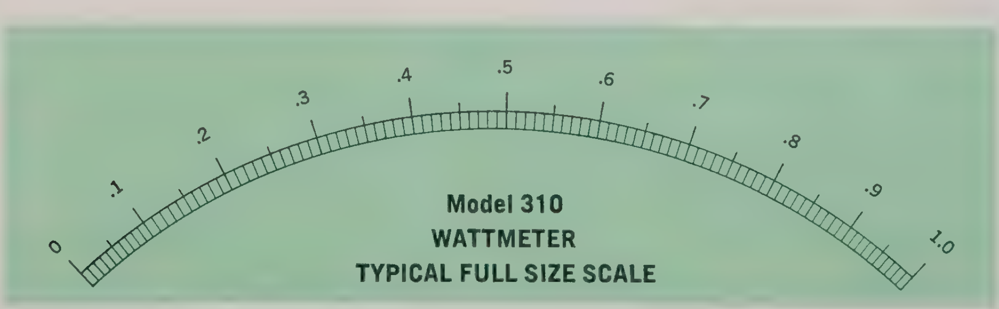
SUMMARY

SPECIFY FORM DESIRED WHEN ORDERING

	Form 1	Form 2	Form 3
Compensated for large temperature changes	yes	no	no
Compensated for potential circuit power	no	yes	no
Equipped with off position switch	yes	no	yes
†Current circuit overload capacity	100%	none	100%
*Potential circuit overload capacity	50%	none	50%
Frequency range for normal accuracy	d-c & 25-125	d-c & 25-125	d-c & 25-600; 100V & above, d-c & 25-1200

†40/20 and 60/30 ampere ranges 50% overload only.

*Applies for ranges up to 400 volts; above 400 volts overload is 20%.



Model 310
WATTMETER
TYPICAL FULL SIZE SCALE

MODEL 310—FORM 1 (FOR GENERAL USE) OR FORM 3 (HIGH FREQUENCY)

Approximate Sensitivity at Normal Voltage—22 Ma.
Wattages Based on Normal Voltage Times Normal Current

Volts Normal	Amperes Normal		Watt Ranges		Range Figured	Scale Div.
	High	Low	High Current Range	Low Current Range		
200/100/50 (Max. 300/150/75)	1	.5	200/100/50	100/50/25	50	100
	2	1	400/200/100	200/100/50	100	100
	2.5	1.25	500/250/125	250/125/62.5	125	125
	5	2.5	1000/500/250	500/250/125	250	125
	10	5	2000/1000/500	1000/500/250	500	100
	20	10	4/2/1 kw	2/1/.5 kw	1 kw	100
	40	20	8/4/2 kw	4/2/1 kw	2 kw	100
	60	30	12/6/3 kw	6/3/1.5 kw	3 kw	150
500/200/100 (Max. 600/300/150)	1	.5	500/200/100	250/100/50	50	100
	2	1	1000/400/200	500/200/100	100	100
	2.5	1.25	1250/500/250	625/250/125	125	125
	5	2.5	2500/1000/500	1250/500/250	250	125
	10	5	5000/2000/1000	2500/1000/500	500	100
	20	10	10/4/2 kw	5/2/1 kw	1 kw	100
	40	20	20/8/4 kw	10/4/2 kw	2 kw	100
	60	30	30/12/6 kw	15/6/3 kw	3 kw	150

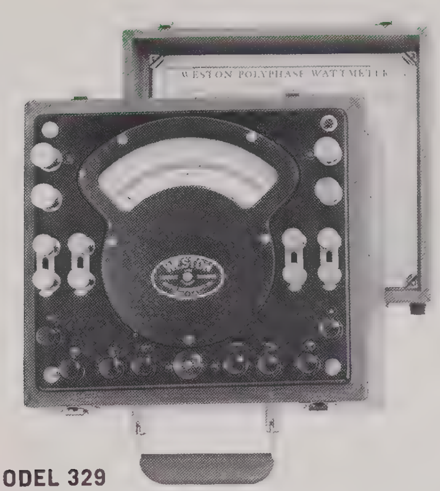
MODEL 310—FORM 2—FOR LOW POWER FACTOR USE

Wattages Based on Max. Volts x Max. Amps x 20%

Volts Max.	Amperes Max.		Watt Ranges		Approx. Sensitivity Ma	Range Figured	Scale Div.
	High	Low	High Current Range	Low Current Range			
150/75	*1	*.5	30/15	15/7.5	35	15	150
	2	1	60/30	30/15	48	30	150
	5	2.5	150/75	75/37.5	48	75	150
	10	5	300/150	150/75	48	150	150

*This range is not compensated for potential circuit power and is useful for special conditions only. Power required for instrument operation will often equal, and in some cases be more than, the power to be measured. Correspondence giving full particulars of the problem is usually required before placing the order.

All ranges listed are self-contained. Higher current ranges are obtained by using a 5 ampere range in conjunction with Model 461, Type 2 or Model 327, Types 1 or 2 Current Transformers. Higher potential ranges are obtained with multipliers or Potential Transformers. See page 7.



MODEL 329

Rated Accuracy 0.50% of Full Scale Value,
Horizontal Position .... Scale 5.25″ (133 mm)
Type: Electrodynamometer
(Shielded from External Magnetic Fields)

Size { 9½ x 10½ x 1/16″
241 x 267 x 205 mm .... Approx. Weight { 18 lbs.
8 kgs.

POWER CONSUMPTION PER ELEMENT

Potential Circuit at 115 volts, 60 cycles—3.4 watts, 3.4 volt-amperes.
Current Circuit at 5 amperes, 60 cycles—0.80 watt, 0.91 volt ampere.

Model 329 Polyphase Wattmeters consist of two electrically independent single phase wattmeters having their movable coils mounted on a common shaft, with each coil surrounded by its own system of field coils. Each system may be used independently with scale errors of less than ½%, which is of great importance for measurements on unbalanced polyphase circuits, or on balanced three phase circuits at low power factors. Model 329 Polyphase Wattmeters are made in three types: Form 1, 2 and 3, with characteristics comparable to those of Model 310 Wattmeters. Correspondence is necessary on all Form 2 requirements. Specify Form desired when ordering.

Model 329 is made with double current and triple voltage ranges. Current ranges are changed by means of links, and voltage ranges have independent binding posts. Power measurements on direct current — single phase a-c, two or three wire circuits — two phase, three or four wire circuits — and on three phase circuits, may be made directly. Form 1 and 3 instruments are provided with "On" and "Off" switches in the potential circuit. Instruments are calibrated at 25°C. A certificate provided with each instrument supplies all essential data.

MODEL 329 — FORM 1 (GENERAL USE) OR FORM 3 (HIGH FREQUENCY)

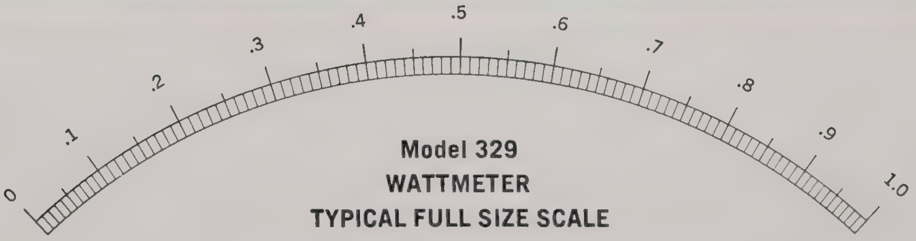
Wattages Based on Two Times Normal Voltage x Normal Current
Approximate Sensitivity Per Element at Normal Voltage—26 Ma.

Volts Normal	Amperes Normal		Watt Ranges		Range Figured	Scale Div.
	High	Low	High Current Range	Low Current Range		
200/100/50	5	2.5	2000/1000/500	1000/500/250	500	100
(Max. 300/150/75)	10	5	4/2/1 kw	2/1/.5 kw	1 kw	100
	20	10	8/4/2 kw	4/2/1 kw	2 kw	100
500/200/100	5	2.5	5000/2000/1000	2500/1000/500	500	100
(Max. 600/300/150)	10	5	10/4/2 kw	5/2/1 kw	1 kw	100
	20	10	20/8/4 kw	10/4/2 kw	2 kw	100

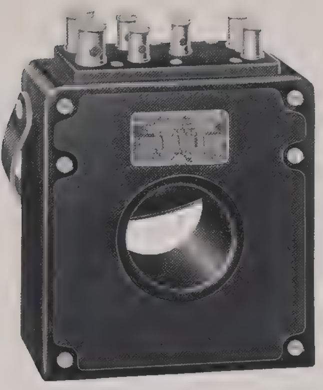
MODEL 329 — FORM 2 (FOR LOW POWER FACTOR USE)

Wattages Based on Maximum Current & Voltage & 20% Power Factor (Both Elements)
Approximate Sensitivity at Maximum Voltage — 47 Millammeter Each Element.

Volts Max.	Amperes Max.		Watt Ranges		Range Figured	Scale Div.
	High	Low	High Current Range	Low Current Range		
150/75	5	2.5	300/150	150/75	150	150
150/75	10	5	600/300	300/150	300	150
300/150	5	2.5	600/300	300/150	300	150
300/150	10	5	1200/600	600/150	600	150
300/150/75	5	2.5	600/300/150	300/150/75	150	150
300/150/75	10	5	1200/600/300	600/300/150	300	150



Model 329
WATTMETER
TYPICAL FULL SIZE SCALE



MODEL 327 CURRENT TRANSFORMER

Size { 9-15/16 x 8⅜ x 3″
252 x 213 x 76 mm .... Approx. Weight { 12½ lbs.
5.7 kgs.

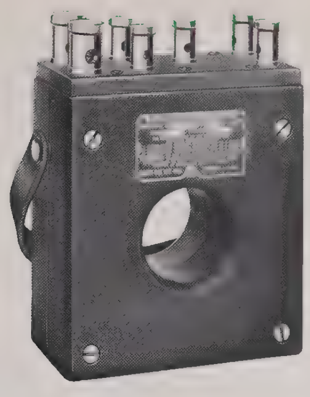
Inserted Primary Opening 2⅞″ (73 mm) Diameter

The Model 327 current transformer is used where the measurement requires the best possible accuracy. Both the ratio and phrase angle errors are held to very small values and are better than any of the other stock Weston current transformers. The Type 2 is more accurate than the Type 1 but both types can be used for wattmeter measurements. Circular 06-600 provides typical ratio and phase angle curves. Ranges from 100 A and lower are directly connected to binding posts; the higher ranges are obtained by inserting turns through the window. The Model 327 is provided with a secondary shorting safety switch. It is housed in a black thermosetting plastic case with a carrying handle.

Ranges, Amperes

*1200/*600/*400/*300/*200/100/50/20/10 Pri. to 5 Sec.

*These ranges are obtained by inserting one, two, etc., turns, respectively, of the primary through the core opening; other ranges are on binding posts.



MODEL 461 CURRENT TRANSFOMER

Size { 8 x 6⅝ x 2¾″
203 x 170 x 70 m --- Approx. Weight { Type 2-8.37 lbs. 3.81 kgs.
Type 5-7.81 lbs. 3.54 kgs.

Inserted Primary Opening 2.12″ (54 mm) Diameter

The Model 461 is a general purpose current transformer having two different range combinations available in either the type 1 or 2. The type 1 is intended for ammeter use because of the larger phase angle error. The type 2 is to be used with wattmeters as well as ammeters. The type 5 has additional low primary ranges for use in standardizing ammeters but can be used for wattmeters. A higher voltage drop, caused by the extra windings, must be considered. Circular 06-600 gives typical ratio and phase angle curves. Ranges of 100 amperes and below are directly connected to binding posts on the types 1 and 2. Higher ranges are obtained by inserting turns. The Model 461 is provided with a secondary shorting safety switch. It is housed in a black thermosetting plastic case with a carrying handle.

Ranges, Amperes

Types 1 & 2 { *800/*400/*200/100/50/20/10 Pri. to 5 Sec.
*1000/*500/*250/100/50/25/10 Pri. to 5 Sec.
Type 5 *500/*250/*100/50/25/10/5/2.5/1/0.5 Pri. to 5 Sec.

*These ranges are obtained by inserting one, two, etc., turns, respectively, of the primary through the core opening; other ranges are on binding posts.

Request Circular 06-600 for Specifications and Characteristics of the Complete Instrument Transformer Line.

RESISTORS OR MULTIPLIERS

External resistors or multipliers are of different types since there are three controlling factors in their design.

1. Full scale watts to be dissipated—influences the size.
2. Full scale voltage to be applied—influences the internal clearances and also the size.
3. Accuracy requirements—high accuracy frequently requires elements of a type differing from those which might be used with instruments of lesser accuracy.

As a result of these factors it is impossible to list the different combinations of external resistors, therefore, correspondence is invited.

For a-c voltage measurements beyond 750 volts and in many cases beyond 300 volts, it is preferable to use a conventional 150 volt instrument with a suitable potential transformer.

When a multiplier is to be supplied with the purchase of an instrument, give complete voltage data. Multipliers should preferably show they have multiplying constants of 2, 5 or 10 times the instrument range with which they are to be used.

When ordering multipliers for existing instruments, specify the model, serial number, normal voltage as well as current ranges (if applicable), scale figuring, the new higher range required, and most important the exact resistance of the instrument ranges.

WESTON INSTRUMENTS DIVISION
WESTON INSTRUMENTS, INC.
614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
a Schlumberger Company

Printed in U.S.A

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PORTABLE STANDARDS

PRICE LIST
06-200

Effective
AUG. 1, 1970
SUPERSEDES ISSUE
DATED 1/1/70

All Prices Subject to Change Without Notice and are F.O.B. Factory, Newark, N.J.

Model 310 D-C And Single Phase A-C Wattmeter (For General Use)

Volts Normal	Ampers Normal		Watt Ranges		Figured Range	Scale Div.	Form 1		Form 3	
	High	Low	High Current Range	Low Current Range			Catalog Number	Price	Catalog Number	Price
200/100/50 (Maximum 300/150/75)	1	.5	200/100/50	100/50/25	50	100	310-6901001	$605.00	310-6901004	$605.00
	2	1	400/200/100	200/100/50	100	100	310-6901007	↓	310-6901011	↓
	2.5	1.25	500/250/125	250/125/62.5	125	125	310-6901012		310-6901013	
	.5	2.5	1000/500/250	500/250/125	250	125	310-6901003s		310-6901006s	
	10	5	2000/1000/500	1000/500/250	500	100	310-6901008		310-6901005	
	20	10	4/2/1KW	2/1/.5KW	1KW	100	310-6901014	$673.00	310-6901015	$673.00
500/200/100 (Maximum 600/300/150)	1	.5	500/200/100	250/100/50	50	100	310-6901022	$673.00	310-6901023	$673.00
	2	1	1000/400/200	500/200/100	100	100	310-6901024	↓	310-6901025	↓
	2.5	1.25	1250/500/250	625/250/125	125	125	310-6901026		310-6901027	
	5	2.5	2500/1000/500	1250/500/250	250	125	310-6901002s	$642.00	310-6901010	$642.00
	10	5	5000/2000/1000	2500/1000/500	500	100	310-6901009s	↓	310-6901028	↓
	20	10	10/4/2KW	5/2/1KW	1KW	100	310-6901029	$719.00	310-6901030	$719.00

Model 310 D-C and Single Phase A-C Wattmeter (Form 2 — For Low Power Factor Use)

Volts Max.	Amperes Max.		Watt Ranges		Approx. Sensitivity MA	Range Figured	Scale Div.	Catalog Number	Price
	High	Low	High Current Range	Low Current Range					
150/75	1	.5	30/15	15/7.5	35	15	150	310-6904004	$605.00
	2	1	60/30	30/15	35	30	150	310-6904003	↓
	5	2.5	150/75	75/37.5	48	75	150	310-6904002	
	10	5	300/150	150/75	48	150	150	310-6904001	

s – Normally carried in stock. Do not include "s" in your order write up.

Model 327 — Current Transformer

Range Amperes	Catalog Number		Price	
	Type 1	Type 2	Type 1	Type 3
1200/600/400/300 200/100/50/20/10 Pri. to 5 Sec.	327-9901001s	327-9902001s	$370.00	$436.00

Model 329 — Polyphase Wattmeter (Approx. Sens. per Element at Normal Voltage is 26 Ma.)

Volts Normal	Amperes Normal		Watt Ranges		Range Figured	Scale Div.	Form 1		Form 3	
	High	Low	High Current Range	Low Current Range			Catalog Number	Price	Catalog Number	Price
200/100/50 (Maximum 300/150/75)	5	2.5	2000/1000/500	1000/500/250	500	100	329-6901007	$1,086.00	329-6901008	$1,086.00
	10	5	4/2/1KW	2/1/.5KW	1KW	100	329-6901009	1,086.00	329-6901010	1,086.00
	20	10	8/4/2KW	4/2/1KW	2KW	100	329-6901011	1,163.00	329-6901012	1,163.00
500/200/100 (Maximum 600/300/150)	5	2.5	5000/2000/1000	2500/1000/500	500	100	329-6901002s	1,133.00	329-6901004	1,133.00
	10	5	10/4/2KW	5/2/KW	1KW	100	329-6901001s	1,133.00	329-6901005	1,133.00
	20	10	20/8/4KW	10/4/2KW	2KW	100	329-6901003	1,201.00	329-6901006	1,201.00

Model 370 — A-C and D-C Ammeters

	D-C and 25-125 Cycles		D-C and 25-1000 Cycles	
Range	Catalog Number	Price	Catalog Number	Price
1/.5	370-2902005s	$528.00	370-2903001s	$560.00
2/1	370-2902004	↓	370-2903002	↓
5/2.5	370-2902003s		370-2903003s	
10/5	370-2902002s		370-2903005s	
20/10	370-2902001s		370-2903004	

Model 370 — A-C and D-C Milliammeters

	D-C and 25-125 Cycles		D-C and 25/1000 Cycles	
Range	Catalog Number	Price	Catalog Number	Price
30/15	370-4903006	$528.00	370-4903001	$560.00
60/30	370-4903007	↓	370-4903009	↓
150/75	370-4903004		370-4903002	
300/150	370-4903008		370-4903010	
500/250	370-4903005		370-4903003	

s — Normally carried in stock. Do not include "s" in order write-up.

Model 341 – A-C and D-C Voltmeters

	D-C and 25-125 Cycles		D-C and 25-1000 Cycles	
Range	Catalog Number	Price	Catalog Number	Price
3/1.5	341-1906001	$472.00	–	–
7.5/3	341-1906004	↓	–	–
15/7.5	341-1906003		341-1902008	$532.00 *
30/15	341-1907003		341-1902001	↓
75/30	341-1902002		341-1902002	
120/60	341-1907002		341-1902003	
150/75	341-1907004		341-1902005	
300/150	341-1907001	$ 492.00	341-1902004	
600/150	341-1907007	492.00	341-1902006	542.00
600/300	341-1907008	492.00	341-1902007	542.00
300/150/75	341-1909002s	$505.00	341-1903002s	565.00
600/300/150	341-1909003s	505.00	341-1903001s	565.00
750/300/150	341-1909001s	505.00	341-1910001	635.00 **

*Accuracy: ¼% D-C and 25-500 cycles; ½% 500-1000 cycles.

**Includes Type 22 Resistor Box for 750 volt range.

Model 461 – Current Transformer

Range Amperes	Catalog Number Type 2	Price Type 2	Catalog Number Type 5	Price Type 5
800/400/200/100/50/20/10 Pri. to 5 Sec.	461-9902001s	$274.00		
1000/500/250/100/50/25/10 Pri. to 5 Sec.	461-9902002s	$274.00		
500/250/100/50/25/10/5/2.5/1/0.5 Pri. to 5 Sec.			461-9902003s	$290.00

Model 9959 – Leather Carrying Cases

Model	Part Number	Price
310	32675s	$47.00
315	32675s	47.00
329	31866	72.00
341	32675s	47.00
370	32675s	47.00

s – Normally carried in stock. Do not include "s" in order write-up.

WESTON INSTRUMENTS DIVISION
WESTON INSTRUMENTS, INC.
614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
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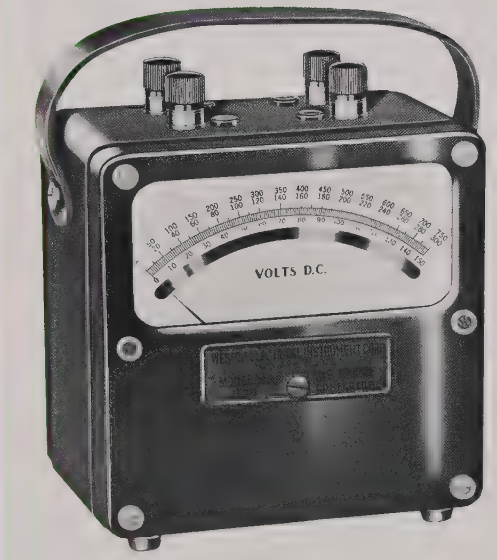


AC/DC PORTABLE INSTRUMENTS

PORTABLE INSTRUMENTS

INTRODUCTION

Engineering educationals, utilities, plant maintenance groups, and contractors have found this complete line of matched portables invaluable for laboratory, production and general a-c and d-c testing. These instruments are moderate in cost, compact, light weight and long scaled, thereby achieving the optimum in test instrument design—portability, readability, sustained high accuracy.

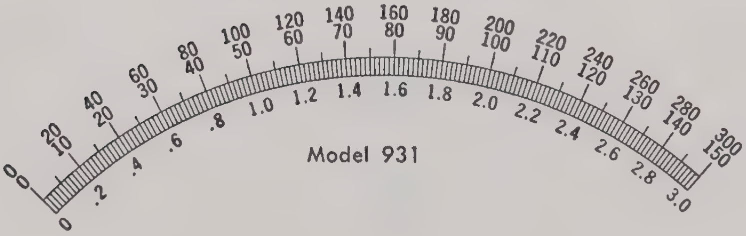
Except where extreme sensitivity is needed such as in thermo instruments, the popular Model 430 has been replaced by what should be an even more popular and useful instrument—the Model 931. A new self-shielding mechanism in the Model 931 D-C Instruments provides such high protection that the magnetic field created by a conductor carrying 7,000 amperes at a distance of three feet from the instrument would cause a temporary error in indication of less than ½ of 1%. This error is considerably less than that allowed by the American Standards Association, even though the test conditions are more than three times as severe.

All instruments are hand calibrated with direct comparison to accurate reference standards, and are equipped with mirror scales and knife edge pointers to eliminate parallax errors. Enclosed in molded bakelite cases having leather carrying straps, these instruments provide versatility of range—ruggedness—sustained high accuracy—and long term dependability. *They are calibrated for use in the horizontal position and should be used in that position if they are to give their best performance.*

The name Weston on electrical test instruments for more than half a century has been a guarantee of the highest standards of quality and reliability. Today, this world-wide acceptance has achieved a reputation for Weston which manifests itself in acknowledged leadership throughout the electrical industry.

For definitions of terms used and other detailed information, reference may be made to American Standards Association standard for Electrical Indicating Instruments C39.1-1964.

TYPICAL FULL SIZE SCALE



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DIRECT CURRENT PORTABLES

MODEL 931

of full scale

3-15-83

MFC

Rated Accuracy 0.5%, horizontal position — Scale 4.04" (103 mm)

Type: Self-Shielded Permanent Magnet Moving Coil
(Shielded from External Magnetic Fields)

Case Size { 3¼ x 5 x 5¼" / 83 x 127 x 133 mm — Approx. Weight { 2 lbs. / 0.9 kg

Well Compensated For Temperature Changes

D-C VOLTMETERS

Self-Contained Ranges: Supplied self-contained for ranges to 1000 volts inclusive. Up to four ranges can be provided on binding posts, or eleven ranges with a switch and two binding posts. On multi-range instruments at 5000 ohms per volt sensitivity for which the highest range is 750 or 1000 volts, external boxes may be required. Correspondence is invited.

Range Extensions: On instruments of 1000 ohms per volt sensitivity, higher ranges to 5000 volts may be obtained with external resistors. Instruments with a sensitivity of 5000 ohms per volt can obtain ranges to 3000 volts with external resistors.

Range	Scale Div.
3	150
15	150
30	150
50	100
150	150
300	150
30/7.5/3	150
75/30/7.5	150
150/15/3	150
300/150/3	150
500/100/10	100
750/300/150	150

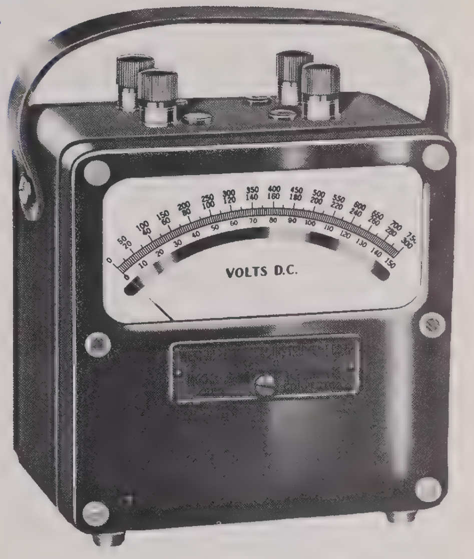
D-C AMMETERS

Self-Contained Ranges: Self-contained up to 50 amperes inclusive. A maximum of three self-contained ranges can be supplied on binding posts.

Range Extensions: For maximum flexibility and where one instrument is required to measure current of a few amperes to hundreds of amperes, a 50 mv instrument with 5' leads and a group of external shunts is recommended. External shunt ammeters are calibrated with scales to suit the shunts selected.

Range	Scale Divisions	Range	Scale Divisions
50 mv.	100	10/1/0.1	100
50 mv.	150	10/5/1	100
1	100	15/3/0.15	150
1.5	150	15/3/1.5	150
3	150	25/2.5/0.5	100
5	100	25/10/2.5	100
7.5	150	30/15/3	150
15	150	50/5/0.5	100
30	150	50/10/2	100
50	100	50/20/5	100
5/0.5/0.05	100	50/25/10	100
5/2.5/0.5	100		

Model 931 is also available as a AC Rectifier Type Voltmeter, Milliammeter or Microammeter.



Model 931 Voltmeter

D-C MILLIAMMETERS

Self-Contained Ranges: Up to four self-contained ranges can be provided on binding posts, a maximum of ten ranges can be provided with a switch and two binding posts.

Range	Approx. Res. Ohms	Scale Divisions
1	93	100
15	1.0	150
150	0.33	150
3/0.3/0.03	167/1540/2800	150
15/1.5/0.15	33.3/315/1340	150
150/15/1.5	0.33/3.24/24.5	150
1500/150/15	0.032/0.32/2.22	150
3000/300/30	0.016/0.16/1.4	150

Single range milliammeters with ranges above 20 ma are shunted and have a drop of 50 mv ±5%.

D-C MICROAMMETERS

Self-Contained Ranges: Up to four self-contained ranges can be provided on binding posts, a maximum of ten ranges can be provided with a switch and two binding posts.

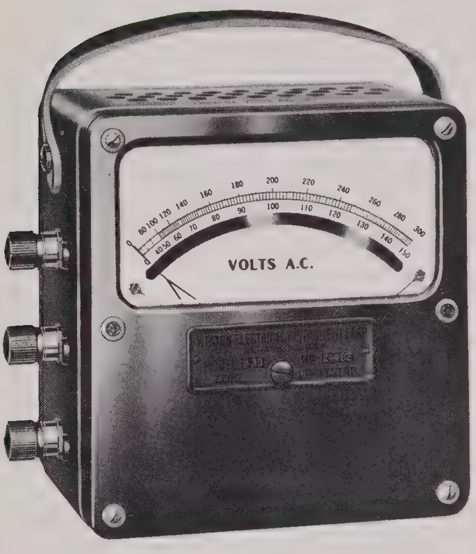
	HIGH RESISTANCE		LOW RESISTANCE
Range	Scale Div.	Approx. Res. Ohms	Approx. Res. Ohms
30	150	2300	490
100	100	2000	60
200	100	600	20

The less expensive high resistance type Model 931 Microammeters, having high torque, will have a service life greater than the low torque instruments, and should be used whenever sufficient energy is available for operation.

The low resistance type is designed to function on the lowest amount of energy consistent with reasonable performance.

ALTERNATING CURRENT PORTABLES

MODEL 433



Rated Accuracy .75%, horizontal position   Scale 4.04 (103 mm)
Type: Movable Iron
(Shielded from External Magnetic Fields)
Case Size { 3¼ x 5 x 5¼″ / 83 x 127 x 133 mm   Approx. Weight { 2½ lbs. / 1.1 kgs.
Well Compensated For Temperature Changes

A-C VOLTMETERS

Power Consumption: 150 volt range at 115 volts, 60 cycles—2.5 watts, 2.5 volt-amperes.

Standard Frequency Coverage: Alternating current at frequencies from 25 to 125 cycles.

High Frequency Coverage: At a surcharge, as many as 3 self-contained ranges can be supplied for a coverage of 25 to 1000 cycles providing the ratio of the highest to lowest range is not greater than 4. Lowest practical range is 15 volts, highest 750 volts. About 3.3 watts minimum is required to operate single range instruments or the low range of multi-range units. Additional ranges are obtained by means of external multipliers.

Coverage to 2500 cycles is possible in single range voltmeters only, with an accuracy within 1¼%. Single ranges from 20 to 750 volts are practical and have an extension on the case to accommodate the additional resistance necessary. Approximately 10 watts are required for operation. Correspondence is necessary.

Self-Contained Ranges: Single, double and triple volt ranges, self-contained up to 750 volts.

Range Extension: Higher ranges obtained with multipliers or by using a Model 311 Potential Transformer in connection with a 150 volt range.

Temperature Influence: Standardized at an ambient temperature of 25C (77F). The temperature influence for a change of ±10C in the ambient temperature for the single range instruments listed is less than 0.25%; for the double range instruments listed is less than 0.35% for the high range and 0.83% for the low range; for the triple range instruments listed is less than 0.04% for the high range, 0.16% for the middle range, and 0.52% for the low range.

For lower ranges or combinations where ratio of highest to lowest range is larger, the temperature influence may also be larger. Information concerning specific ranges or combinations can be supplied on request.

Frequency Error: From the calibration frequency of 60 cycles the frequency error to 125 cycles for the single range instruments listed is less than 0.26%; for double range instruments listed is less than 0.55% for the high range and 1.76% for the low range; and for triple range instruments listed is less than 0.07% for the low range, 0.16% for the medium range, and 0.64% for the high range.

From the calibration frequency of 60 cycles the frequency error to 400 cycles for the single range instruments listed is less than 3.3%; for double range instruments listed 5.8% and 22.8%; for triple range instruments listed 0.92%, 2.10%, 8.38%.

At higher frequencies, the error can be approximated by multiplying the 400 cycle error by the square of the ratio of the desired frequency to 400 cycles.

For lower ranges or combinations when ratio of highest to lowest range is large, the frequency error may be larger. Information concerning specific ranges on combinations can be supplied on request.

Range	Scale Div.	Approx. Res. Ohms
10	100	40
15	150	88
30	150	335
50	100	700
75	150	1700
125	125	4400
150	150	5300
250	125	18,200
300	150	22,000
10/5	100	24/12
20/10	100	116/58
30/15	150	336/168
60/30	150	850/425
150/75	150	5300/2680
300/150	150	22,000/11,000
450/300/150	150	33,000/22,000/11,000
**600/300/150	150	44,000/22,000/11,000
**750/300/150	150	55,000/22,000/11,000

***These triple range voltmeters have an extension on the case to accommodate the additional resistance necessary.*

A-C MILLIAMMETERS—MODEL 433

Standard Frequency Coverage: Single and double ranges only, for use on frequencies from 25 to 500 cycles. Double range instruments have a range selector switch.

High Frequency Coverage: Subject to a nominal surcharge, these instruments can be adjusted to cover a frequency span from 25 to 1000 cycles at the normal ¾% accuracy. At a higher surcharge, adjustment can be made to cover a frequency span from 25 to 2500 cycles within ¾% accuracy. Correspondence regarding these special instruments is necessary.

(Continued)

Range	Scale Div.	Approx. Res. Ohms
15	150	1850
30	150	460
75	150	78
100	100	49
150	150	13
200	100	8.8
250	125	6.0
300	150	3.9
400	80	2.5
500	100	2.0
600	120	1.13
750	150	0.74
100/50	100	74/296
150/75	150	30/120
300/150	150	6.4/26
500/250	100	1.6/6.6

A-C AMMETERS

Power Consumption: 5 ampere range at 5 amperes, 60 cycles—0.50 watt, 0.52 volt-ampere.

Standard Frequency Coverage: Single, double and triple ranges for use on frequencies from 25 to 500 cycles.

High Frequency Coverage: Single and double range instruments can, subject to a nominal surcharge, be adjusted to cover a frequency span from 25 to 1000 cycles at the normal ¾% accuracy. At a slightly higher surcharge, these instruments can also be specially compensated to cover a frequency span of 25 to 2500 cycles, within ¾% accuracy. Correspondence regarding these special instruments is necessary.

Three and four ranges can be supplied at 1% accuracy from 25 to 1000 cycles.

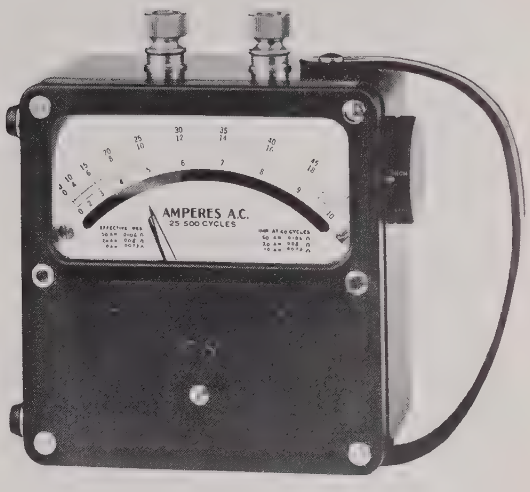
Self-Contained Ranges: Single, double and triple ranges, self-contained up to 50 amperes. Triple range instruments have internal current transformer. All instruments have two binding posts, double and triple range instruments are provided with a range selector switch.

Range Extension: For ranges above 50 amperes, the Model 461 Current Transformer, Type 1, used in conjunction with a 5 ampere instrument is recommended.

Range	Scale Div.	Approx. Res. Ohms
1	100	0.48
1.5	150	0.20
2	100	0.12
3	150	0.053
5	100	0.020
10	100	0.007
15	150	0.0038
25	125	0.0016
30	150	0.00063
50	100	0.00038
2/1	100	0.12/0.48
5/2.5	100	0.02/0.08
10/5	100	0.0083/0.028
20/10	100	0.004/0.0108
3/1.5/0.75	150	*0.18/0.43/0.59
5/2.5/1	100	*0.13/0.26/0.37
10/5/1	100	*0.030/0.070/0.37
10/5/2.5	100	*0.030/0.060/0.075
15/7.5/1.5	150	*0.023/0.044/0.19
20/5/2	100	*0.040/0.19/0.30
30/7.5/3	150	*0.0090/0.036/0.040
50/20/5	100	*0.0084/0.011/0.020
50/20/10	100	*0.0073/0.0080/0.010

* Impedance at 60 cycles

Model 433 Ammeters with Adjustable Pointer-Stop



An adjustable pointer-stop is provided to facilitate measuring the starting current of a motor or other device which requires more current at the start than during normal operation.

The pointer-stop is located against the left side of the indicating pointer and is moved manually to position the indicating pointer just below the anticipated maximum starting current.

By moving the indicating pointer to this position, the distance the pointer travels, due to the starting current, is shortened and a reading can be obtained which is as near correct as possible with this form of indicating instrument.

ALTERNATING CURRENT PORTABLES

D-C AND SINGLE PHASE A-C WATTMETERS

Rated Accuracy 0.5%, horizontal position — Scale 4.04 (103 mm)

Type: Electrodynamometer

(Shielded from External Magnetic Fields)

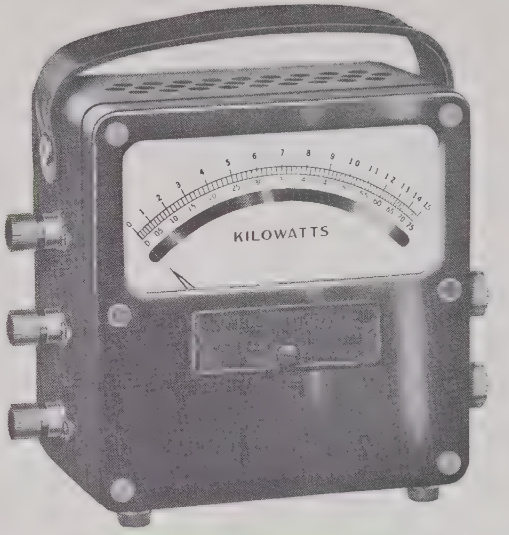
Case Size { 3¼ x 5 x 5¼″ / 83 x 127 x 133 mm — Approx. Weight { 3¼ lbs. / 1.5 kgs.

Power Consumption: Potential circuit at 115 volts, 60 cycles—1.2 watts, 1.2 volt-amperes. Current circuit at 5 amperes, 60 cycles—0.65 watt, 0.68 volt-amperes.

Standard Frequency Coverage: Alternating current at frequencies from 25 to 125 cycles.

High Frequency Coverage: Can be compensated, at a surcharge, to cover a frequency span up to 1000 cycles at an accuracy within 0.5%; for 2500 cycles the accuracy is within 0.5% to 1000 cycles and 1% above 1000 cycles, except for the low power factor types where the accuracy above 1000 cycles is 1.5%. Correspondence required.

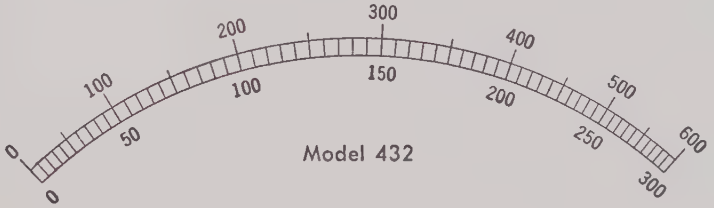
Self-Contained Ranges: Double voltage and single or double current ranges, self-contained up to 300 volts and 50 amperes. Double current ranges are obtained by means of a range selector switch.



Model 432 Wattmeter

Range Extension: Potential ranges up to 750 volts obtained with external multipliers. Higher ranges require the use of potential transformers such as the Model 311. Current ranges may be extended beyond 50 amperes by using a 5 ampere instrument with the Model 461, Type 2, Current Transformer.

TYPICAL FULL SIZE SCALE



For Low Power Factor Use

Volts Maximum	Amperes Maximum	Watts High Rg.	Watts Low Rg.	Scale Div.
150/75	.5	15	7.5	75
	1	30	15	75
	2	60	30	60
	5	150	75	75
	10	300	150	75
250/125	.2	10	5	100
	.4	20	10	100
	1	50	25	100
	2	100	50	100
	4	200	100	100
	10	500	250	100
300/150	.2	12	6	60
	.5	30	15	75
	1	60	30	60
	2	120	60	60
	5	300	150	75
	10	600	300	60
150/75	1/.5	30/15	15/7.5	75
	2/1	60/30	30/15	60
	5/2.5	150/75	75/37.5	75
	10/5	300/150	150/75	75
250/125	.4/.2	20/10	10/5	100
	.8/.4	40/20	20/10	100
	2/1	100/50	50/25	100
	4/2	200/100	100/50	100
	8/4	400/200	200/100	100
300/150	.5/.25	30/15	15/7.5	75
	1/.5	60/30	30/15	60
	2/1	120/60	60/30	60
	5/2.5	300/150	150/75	75
	10/5	600/300	300/150	60

For General Use

Volts		Amperes		Watts		
Normal	Max.	Normal	Max.	High Rg.	Low Rg.	Scale Div.
100/50	130/65	.1	.15	10	5	100
		.2	.3	20	10	100
		.5	.75	50	25	100
		1	1.5	100	50	100
		2	3	200	100	100
		5	7.5	500	250	100
		10	15	1 KW	0.5 KW	100
		20	30	2 KW	1 KW	100
		50	75	5 KW	2.5 KW	100
150/75	200/100	.1	.15	15	7.5	75
		.2	.3	30	15	75
		.5	.75	75	37.5	75
		1	1.5	150	75	75
		2	3	300	150	75
		5	7.5	750	375	75
		10	15	1.5 KW	.75 KW	75
		20	30	3 KW	1.5 KW	75
		50	75	7.5 KW	3.75 KW	75
200/100	260/130	.1	.15	20	10	100
		.2	.3	40	20	80
		.5	.75	100	50	100
		1	1.5	200	100	100
		2	3	400	200	80
		5	7.5	1 KW	0.5 KW	100
		10	15	2 KW	1 KW	100
		20	30	4 KW	2 KW	80
		50	75	10 KW	5 KW	100
300/150	400/200	.1	.15	30	15	75
		.2	.3	60	30	60
		.5	.75	150	75	75
		1	1.5	300	150	75
		2	3	600	300	60
		5	7.5	1.5 KW	.75 KW	75
		10	15	3 KW	1.5 KW	75
		20	30	6 KW	3 KW	60
		50	75	15 KW	7.5 KW	75
150/75	200/100	1/.5	1.5/.75	150/75	75/37.5	75
		2/1	3/1.5	300/150	150/75	75
		5/2.5	7.5/3.75	800/400	400/200	80
		10/5	15/7.5	1500/750	750/375	75
200/100	260/130	1/.5	1.5/.75	200/100	100/50	100
		2/1	3/1.5	400/200	200/100	100
		5/2.5	7.5/3.75	1000/500	500/250	100
		10/5	15/7.5	2/1 KW	1/.5 KW	100
300/150	400/200	1/.5	1.5/.75	300/150	150/75	75
		2/1	3/1.5	600/300	300/150	60
		5/2.5	7.5/3.75	1500/750	750/375	75
		10/5	15/7.5	3/1.5 KW	1.5/.75 KW	75

Y-Boxes For Model 432 Wattmeters

A Model 432 single phase a-c wattmeter can be used to measure the power in a balanced 3 phase, 3 wire system by means of an external Y-Box. The Y-Box must be adjusted for use with a specific instrument, and the three phases of the load must be balanced in both phase angle and magnitude.

The Y-Box in its simplest form is a center tapped resistor with the resistance in each leg equal to the total instrument potential circuit resistance. When the instrument is connected to form the third leg, an artificial neutral is formed and the phase voltage of the system is impressed upon the instrument. The total three phase power will then be three times the instrument indication. Three phase systems having a phase voltage greater than the maximum rating of the instrument use a Y-Box in which the resistance in each leg is adjusted to a multiple of the instrument resistance with a corresponding increase in scale multiplying constant.

The line voltage of the system should be no higher than the maximum rating of the Y-Box. For example, a 75/150 volt (normal) instrument should use a 150 volt Y-Box with the 75 volt instrument range for line voltages of 100-170 volts, and a 300 volt Y-Box with the 150 volt instrument range for line voltages of 200-340 volts. Both of these combinations would have multipliers of three. Higher system line-to-line voltages would use the 150 volt instrument range with a Y-Box adjusted for the higher voltage and a correspondingly higher multiplying factor. Special combinations can be worked out for other instrument ranges when necessary.

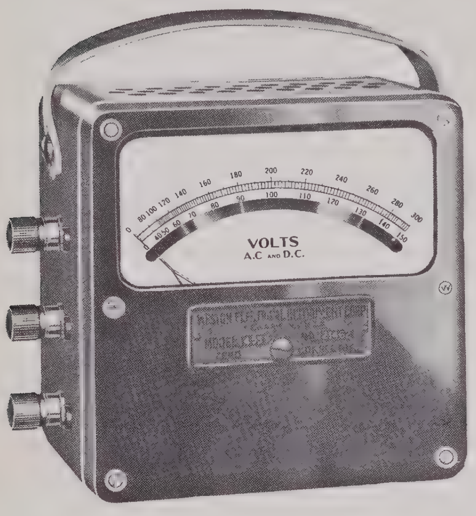
Normal Voltage of Instrument	Y-Box Multiplying Constant	Normal Line Voltage With Y-Box	Maximum Voltage With Y-Box	Type Box
75	3	150	170	51
100	3	200	230	51
150	3	300	340	52
150	4	400	450	52
150	5	500	550	53
150	6	600	650	53

All orders for Y-Boxes must give the instrument potential range with which the box will be used and the line voltage of the 3 phase system to be measured.

All orders for Y-Boxes to be used with meters already in possession of the purchaser must give the serial number of the instrument, since the box is for use with a specific instrument only.

ALTERNATING CURRENT PORTABLES

Rated Accuracy 0.5%, horizontal position
Type: Electrodynamometer
Scale 4.04" (103 mm)
Case Size { 3¼ x 5 x 5¼" / 83 x 127 x 133 mm
Approx. Weight { 2½ lbs. / 1.1 kgs.



Model 455 Voltmeter

A-C AND D-C VOLTMETERS

Power Consumption: 150 volt range at 115 volts 60 cycles—2.3 watts, 2.3 volt-amperes.

Standard Frequency Coverage: Direct current, and alternating current at frequencies from 25 to 125 cycles. Preferable to iron vane instruments where both types of power are involved.

High Frequency Coverage: Single and double range instruments can be provided for coverage of d-c, and a-c frequencies of 25 to 1000 cycles. Double range voltmeter ranges must have a ratio not greater than 2 to 1. Range coverage from 10 to 750 volts is practical. A minimum of about 3.5 watts is required to operate a single range instrument or the low range of a double range unit.

Coverage up to 2500 cycles is possible in single range instruments only, within the normal ½% accuracy by special compensation. Ranges from 20 to 750 volts are practical. Instrument operation requires about 8 watts minimum.

Ranges: Supplied in most ranges listed for Model 433 although their resistance may not correspond.

A-C AND D-C AMMETER

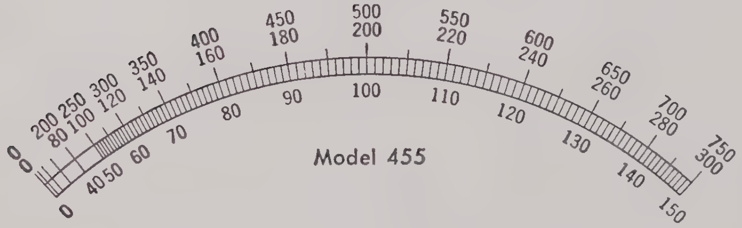
Power Consumption: 5 Ampere Range at 5 Amperes, 60 cycles — 0.32 Watts, 0.34 Volt-Amperes.

Standard Frequency Coverage: Direct Current and alternating current at frequencies from 25-500 cycles.

High Frequency Coverage: Instrument is compensated to cover a frequency span of 25-2500 cycles at an accuracy within 0.75%

Range: 5 Amperes

TYPICAL FULL SIZE SCALE



Carrying Cases For All Models

To insure longer service, instruments should be housed in leather cases when stored or when being transported on the job.

When ordering please specify the model numbers and case (standard or extended) of the instruments with which they are to be used.

Ordering Information

When placing an order for Weston Instruments always include the following, and supplement this information with as much additional pertinent data as possible.

1. Model Number and Range.
2. For Direct or Alternating Current.
3. Sensitivity, if other than Listed.
4. Frequency, if other than Standard.
5. Position in use, if other than Horizontal.
6. Leather Carrying Case.

WESTON INSTRUMENTS DIVISION
WESTON INSTRUMENTS, INC.
614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
a Schlumberger company

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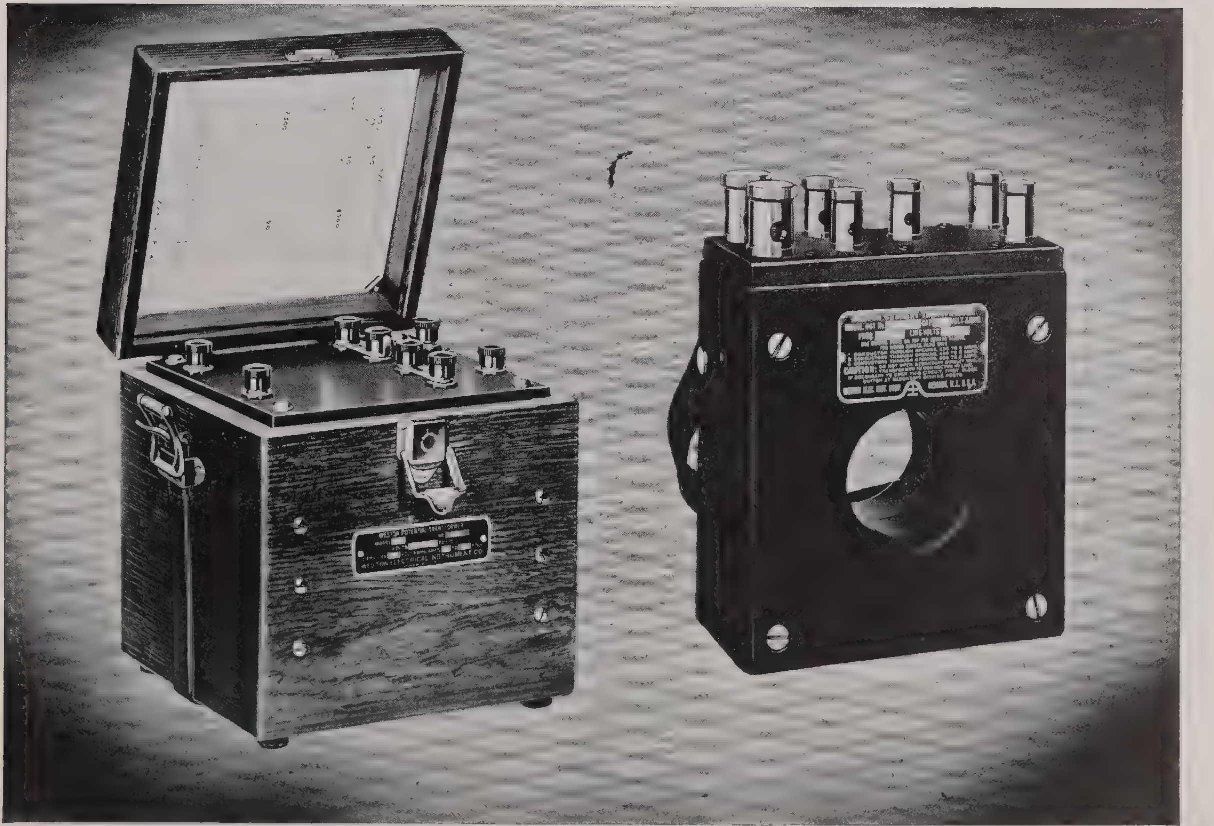
WESTON®

PORTABLE
INSTRUMENT TRANSFORMERS



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WESTON INSTRUMENT TRANSFORMERS . . .

GENERAL

Weston Instrument Transformers embody the best of design and are carefully constructed of superior materials. They provide a wide variety of ranges and amply meet most requirements without correction factors.

Current transformers of Weston manufacture all have ring cores without joints. Use of this type of core makes it possible to keep the phase angle and ratio error to a minimum well below transformers having joints. A fractional turn compensation is provided, through special means, resulting in the highest possible accuracy.

Weston Potential Transformers are of core type construction, with form wound coils, particular attention being paid to high insulation as well as to minimum losses.

For easy reference, transformer capacities, frequencies, voltage ratings and expected error at different burdens are compiled in Table 1 on page 4. This table should aid in selection of the desired transformer.

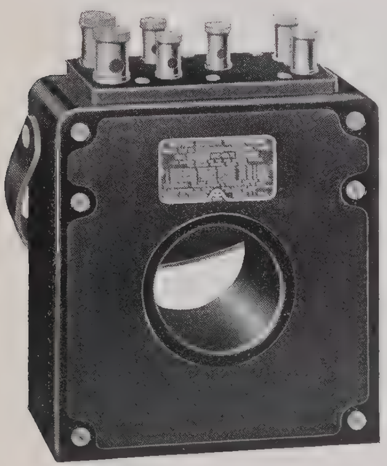
Where extreme accuracy is required, individual correction curves can be made for transformers, and copies of these will be supplied with the specific transformer at a surcharge. The tests are made at the Weston engineering laboratories. Attention is called to the discussion of correction curves on page 5 and the typical curves on pages 6, 7 and 8.

Frequency Rating

While designed primarily for 60 cycle service, these transformers may be used at other frequencies. The nominal rating is given in Table 1.

Potential Transformers: The transformers should never be used below the frequency given since it may cause overheating and damage the windings. These transformers may be used at higher frequencies such as 400 cps and at this frequency the ratio error will be approximately the same as at 60 cps. The phase angle, however, is large and for this reason correction curves should be used with wattmeters and power factor meters at the higher frequencies where precise measurements are required.

Current Transformers: Current transformers may be used below their rated frequency without damage but with possible loss in accuracy. These transformers may also be used at higher frequencies with very little change in accuracy. Typical curves showing ratio correction factor and phase angle at 80% rated current for frequencies up to 2500 cps are shown on pages 7 and 8.



MODEL 327 CURRENT TRANSFORMER

Size { 9.93″ x 8.38″ x 3″ / 252 x 213 x 76 mm .... Approx. Weight { 12.5 lbs. / 5.7 kgs.

Inserted Primary Opening: 2.85″ (72 mm) diameter

The high accuracy of Model 327 Current Transformers, which employ special nickel alloy cores, makes them ideal for laboratory as well as industrial uses. Type 2 differs from Type 1 in that it provides the maximum precision. Reference should be made to the table on page 4 for characteristics of Model 327.

Model 327 is provided with a short circuiting switch and is housed in a black molded case with a leather carrying handle.

Ranges, Amperes

*1200/*600/*400/*300/*200/100/50/20/10 Pri. to 5 Sec

***These ranges are obtained by inserting 1, 2, 3, 4 and 6 turns, respectively, of the primary through the core opening; other ranges are on binding posts.**

MODEL 539 MINIATURE CURRENT TRANSFORMER

Size { 5.49″ x 4.1″ x 1.88″ / 140 x 104 x 48 mm .... Approx. Weight { 3.0 lbs. / 1.4 kgs.

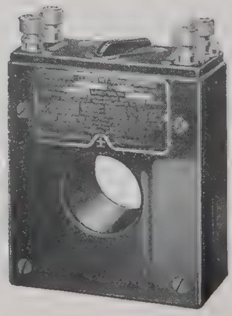
Inserted Primary Opening: 1.5″ (38 mm) diameter

Model 539 is a small, light weight, inexpensive transformer for use where only moderate accuracy is required with low burden ammeters having a range of one ampere. Ordinarily it cannot be used with a wattmeter since its phase angle, while satisfactory for current measurements, precludes its use for power measurements. Provided with a secondary short circuiting switch. Contained in a black molded case.

Ranges, Amperes

*200/*100/*50/20/10/5/2 Pri. to 1 Sec

***These ranges are obtained by inserting one, two, etc. turns respectively, of the primary through the core opening; other ranges are on binding posts selected through a switch.**



MODEL 461 CURRENT TRANSFORMER

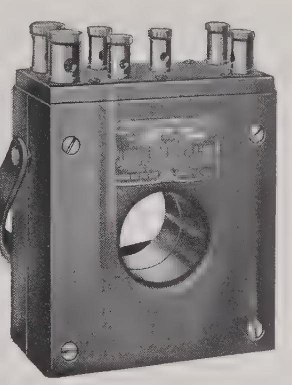
Size { 7.97″ x 6.63″ x 2.75″ / 203 x 170 x 70 mm ....App. Wt. { Type 1—8.0 lbs. 3.64 kgs. / Type 2—8.37 lbs. 3.81 kgs. / Type 5—7.81 lbs. 3.54 kgs.

Inserted Primary Opening: 2.12″ (54 mm) diameter

Model 461 is a general purpose current transformer providing wide varieties of ranges in three types, with adequate accuracy for most industrial measurements.

Type 1 is primarily for use with ammeters. Type 2, which has a nickel alloy core and corresponding low phase angle, is preferable for wattmeters as well as ammeters. Type 5 is similar to Type 2, but designed primarily to standardize ammeters, particularly in the lower ranges, but can be used with wattmeters and ammeters to measure load currents and power. Because of the relatively high voltage drop in the low ranges of Type 5, it may be necessary to increase the voltage source to the load by the amount of the transformer voltage drop, in order to maintain the voltage across the load.

Characteristics of Model 461 transformers are listed on page 4. A secondary short circuiting switch is provided. All types are supplied in black molded cases.



Ranges in Amperes

Type 1 or 2 { *1000/ *500/ *250/ 100/ 50/ 25/ 10 pri to 5 sec.
Type 1 or 2 { *800/ *400/ *200/ 100/ 50/ 20/ 10 pri to 5 sec.

*These ranges are obtained by inserting 1, 2 and 4 turns respectively of the primary through the core opening; other ranges are on binding posts.

Type 5 *500/ *250/ *100/ 50/ 25/ 10/ 5 / 2.5/ 1/ 0.5 pri to 5 sec.

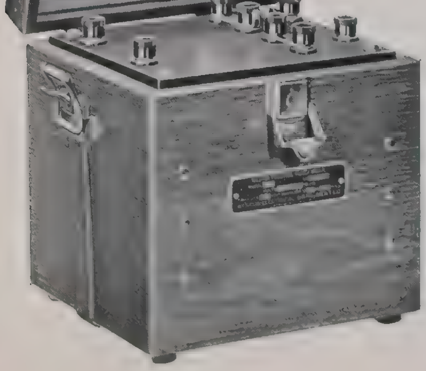
*These ranges are obtained by inserting 1, 2 and 5 turns respectively of the primary through the core opening; other ranges are on binding posts.

MODEL 311 POTENTIAL TRANSFORMER

Size { 8.13″ x 7.5″ x 8.25″ / 206 x 191 x 210 mm ....Approx. Weight { 25 lbs. / 11 kgs.

Model 311 Types 1 and 2 Potential Transformers are used with voltmeters and wattmeters. They can be used without correction curves for normal accuracies. For precise use, correction curves can be supplied at a surcharge.

Types 1 and 2 have double primary ranges with a ratio of 2 to 1, obtained by connecting separate primary windings in either series or parallel by means of links. These transformers are provided with four binding posts, two for connection to the line and two for connection to the meter.



Characteristics of Model 311 Potential Transformers are given in the table on page 4.

Model 311 is supplied in a polished oak case with removable cover and leather carrying strap.

Type 1

Max. Secondary Burden, 15 Volt-Amperes, Frequency 25 to 125 Cycles

Ratios	
Normal Volts	Maximum Volts
2300/1150 to 115	3000/1500 to 150
460/230 to 115	600/300 to 150

Type 2

Max. Secondary Burden, 25 Volt-Amperes, Frequency 50 to 125 Cycles

Normal Volts	Maximum Volts
6900/3450 to 115	9000/4500 to 150
4600/2300 to 115	6000/3000 to 150

Model 311 Type 3 Standardizing Potential Transformer

This type potential transformer provides low a-c voltages for laboratory use in standardizing voltmeters and operates on frequencies of 50 to 125 cycles. It differs from the conventional type of potential transformer in that it has three windings. The primary, or exciting winding, is connected to an external regulating device, such as a variable transformer or rheostat, which will provide voltages between 120 and 0. One secondary standard winding is connected to a 150 volt range accurate reference standard a-c voltmeter having a resistance of 1500 ohms or higher. The other secondary winding has ranges of 30/15/7.5/3/1.5 volts. The voltmeter under test is connected to the appropriate range of this winding.

The ratio error between the two secondary windings will be less than 0.1% of the marked secondary rating, if the standard voltmeter requires less than 100 milliamperes and the voltmeter under test requires less than 500 milliamperes.

WESTON INSTRUMENT TRANSFORMERS . . .

TRANSFORMER CHARACTERISTICS AND POSSIBLE ERROR

Ratio error and phase angle of these transformers ordinarily may be disregarded if the accuracy needs are within the maximum percentages of error listed in Table 1 below, which assumes the worst conditions of burden and lagging power factor.

Table 1 gives possible error in per cent of full scale (5 amperes, 150 volts) at 60 cycles for currents of 10 to 100% of rated current and voltages of 50 to 110% of rated voltage. These values are typical of what can be expected for any transformer of the type listed, and will serve as a guide to selection of the proper transformer, depending on the transformer accuracy desired and the accuracy of the instrument with which it is to be used. (See Table 2 for accuracy classes of several Weston instruments and their approximate burdens.)

Burdens of 0 to 100% and 30 to 100% listed in Table 1 represent the percentage range of the rated capacity over which there will be no greater error than indicated. These burdens should be considered as those typical of indicating instruments.

The maximum error stated for wattmeters assumes use of the low power factor wattmeter, based on 20% power factor for the range of 0 to 1.0 power factor. For 0.6-1.0 power factor, it is assumed that the standard unity power factor wattmeter is used.

TABLE 1

MODEL	TYPE	RANGE	CHARACTERISTICS		VOLTAGE RATING	MAXIMUM ERROR %, 60 cps			
						AMMETER or VOLTMETER		WATTMETER	
			CAPACITY VOLT-AMPERES	FREQUENCY CPS		BURDEN 0-100% TRANS. CAP.	BURDEN 30-100% TRANS. CAP.	BURDEN 0-100% TRANS. CAP. LOAD PF 0-1 LAG.	BURDEN 30-100% TRANS. CAP. LOAD PF .6-1 LAG.
311	1	460/230:115	15	25-125	--------	0.45	0.25	0.45	0.25
311	1	2300/1150:115	15	25-125	--------	0.45	0.25	0.45	0.25
311	2	4600/2300:115	25	50-125	--------	0.35	0.35	0.35	0.35
311	2	6900/3450:115	25	50-125	--------	0.35	0.35	0.35	0.35
327	1	1200/100/50/20/10:5	25	25-500	2500	0.15	0.10	0.55	0.20
327	2	1200/100/50/20/10:5	25	25-500	2500	0.07	0.04	0.11	0.05
461	1	800/100/50/20/10:5	15	25-500	2500	0.40	0.25	2.70	0.80
461	1	1000/100/50/25/10:5	15	25-500	2500	0.35	0.25	2.10	0.72
461	2	800/100/50/20/10:5	15	25-500	2500	0.25	0.15	0.85	0.31
461	2	1000/100/50/25/10:5	15	25-500	2500	0.25	0.15	0.85	0.31
461	5	500/50/25/10/5/2.5/1/.5:5	15	50-500	1200	0.35	0.15	0.75	0.20
539		200/20/10/5/2:1	2	25-500	750	1.0	1.0	------	3.00

APPROXIMATE BURDENS OF WESTON INSTRUMENTS

Approximate burdens (loss) for the 5 ampere instruments at 5 amperes 60 cycles and the 150 volt instruments at 115 volts 60 cycles are representative of the Weston line of instruments used with transformers. The values are given for convenience of the user.

TABLE 2

MODEL	ACCURACY CLASS	DESCRIPTION	Current Circuit Burden (Loss)		Potential Circuit Burden (Loss)	
			Volt-Amperes	Power Factor	Volt-Amperes	Power Factor
310	1/4%	Forms 1 & 3 Wattmeter	0.91	0.88	2.9	1.0
310	1/4%	Form 2 Low pf Wattmeter	3.9	0.90	4.4	1.0
329	1/2%	Forms 1 & 3 Wattmeter	0.91	0.88	3.4	1.0
329	1/2%	Form 2 Low pf Wattmeter	3.4	0.90	4.1	1.0
338	.005 PF	1 Phase pf Meter	3.3	0.72	6.0	0.88
338	.005 PF	3 Phase pf Meter	3.3	0.72	5.3	1.0
341	1/4%	Voltmeter	----	----	3.3	1.0
370	1/4%	Ammeter	4.7	0.96	----	----
432	1/2%	Regular Wattmeter	0.65	0.95	1.2	1.0
432	1/2%	Low pf Wattmeter	2.7	0.95	1.6	1.0
433	3/4%	Ammeter & Voltmeter	0.50	0.97	1.2	1.0
455	1/2%	Voltmeter	----	----	2.3	2.3
480	1°	Phase Angle Meter	1.8	0.87	8.8	0.77
639	1 to 2%	Analyzer	6.0	0.75	7.0	1.0
904	1/2%	Ammeter & Voltmeter	0.44	0.87	2.2	1.0
905	1/2%	Wattmeter	0.83	0.97	2.7	1.0

CORRECTION CURVES

Current and potential transformers are subject to negligible ratio and phase angle errors, however in most instances these errors need not be considered. Where accuracies greater than those listed in Table 1 are required, the typical curves shown on pages 6, 7 and 8 may be applied.

Where the utmost precision is required and highly accurate instruments are being used, correction curves for these negligible transformer errors may be desirable. Specific ratio and phase angle curves can be supplied at commercial power frequencies such as 25, 50, 60 cycles for a nominal charge for an individual transformer at the time of purchase.

For current transformers, correction curves shall cover a secondary current span of 0.5 to 5.0 amperes, and for potential transformers a secondary voltage span of 25 to 150 volts.

In order to provide curves for an existing transformer, it is necessary that it be returned to the factory for testing.

Ratio errors effect accuracy of ammeters and voltmeters. Phase angle, but not ratio error influences accuracy of power factor and phase angle meters. Ratio errors and phase angle may effect wattmeter accuracy.

APPLICATION OF CORRECTION CURVES TO WESTON TRANSFORMERS

When the transformer is used with voltmeters or ammeters it is necessary only to multiply the indicated voltage or current by the ratio correction factor given on the curve.

For wattmeters it is necessary to apply both the ratio correction factor and phase angle error in the following formula:

$$\text{True power} = \text{Indicated power} \times \frac{F_v F_c \cos(\phi + \beta - \gamma)}{\cos \phi}$$

Where F_v = Ratio correction factor for potential transformer.

F_c = Ratio correction factor for current transformer.

β = Phase angle of current transformer.

γ = Phase angle of potential transformer.
β and γ are considered + when the reversed secondary vector leads the primary vector. (American Standard Definitions of Electrical Terms, C 42.15—1958.)

ϕ = Apparent phase angle of circuit, $\cos \phi$ = ratio of Watts to Volt Amperes measured on secondary side of transformers. Considered + when current lags potential.

Information needed when asking for specific correction curves required for a Weston transformer includes the following:

Volt-amperes and power factor, or ohms and henries, or model number and range of instrument or instruments with which transformer is to be used.

Size of wire and lead length between instrument and current transformer, or total lead resistance should be stated; 10 double feet of #14 copper wire (resistance 0.05 ohm) will be assumed if lead length is not specified. Details on connecting wires are not required for potential transformers.

If different types of curves are needed for use with a number of transformers of the same model and range, specify the various curve requirements.

CORRECTION CURVES TYPICAL of WESTON CURRENT TRANSFORMERS at 60 CPS

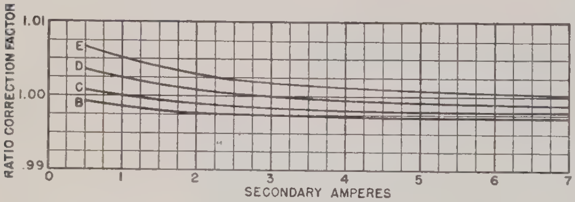
Key to Secondary Burdens, at 60 cycles

Curve	Ohms	Mh	Va	PF
B	0.036	0.046	1.0	0.9
C	0.090	0.116	2.5	0.9
D	0.180	0.232	5.0	0.9
E	0.270	0.347	7.5	0.9
F	0.450	0.580	12.5	0.9
G	0.900	1.153	25.0	0.9
H	0.450	0.578	0.5	0.9
J	0.900	1.153	1.0	0.9
K	2.250	2.88	2.5	0.9

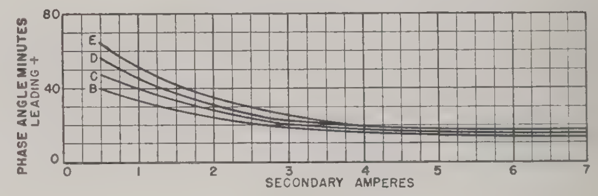
Curve C is A.S.A. burden B-0.1 and N.E.M.A. burden X. Curve D is A.S.A. burden B-0.2 and Curve F is A.S.A. burden B-0.5.

Model 461 Type 1 Current Transformer

Ratio Correction Curves

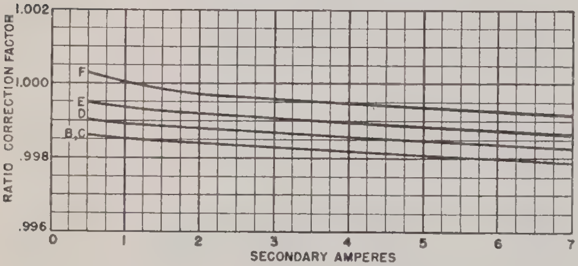


Phase Angle Curves

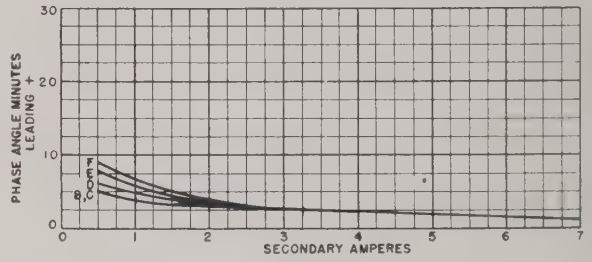


Model 461 Type 2 Current Transformer

Ratio Correction Curves

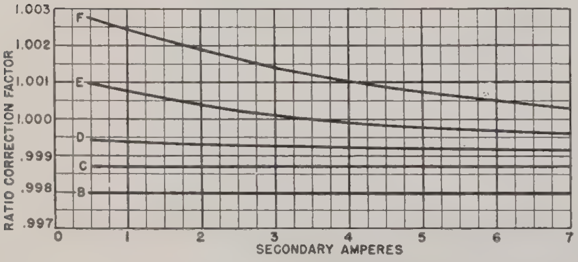


Phase Angle Curves

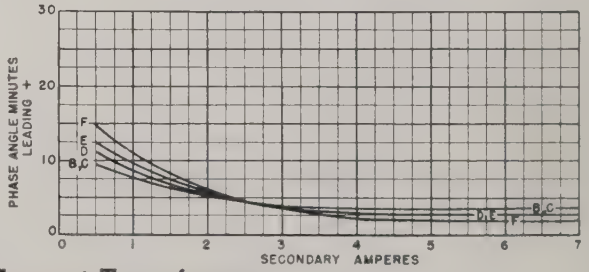


Model 461 Type 5 Current Transformer

Ratio Correction Curves

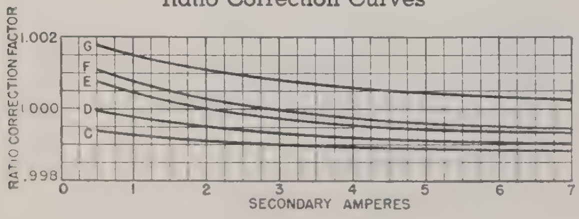


Phase Angle Curves

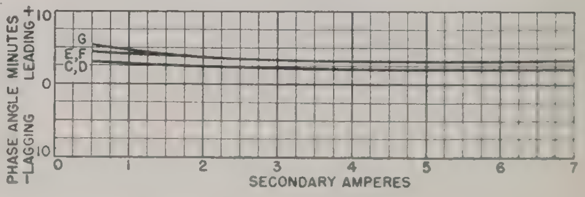


Model 327 Type 1 Current Transformer

Ratio Correction Curves



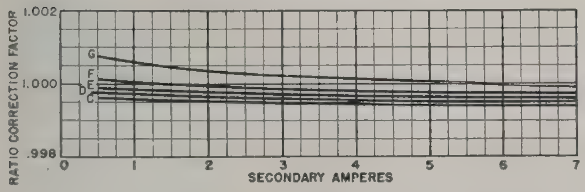
Phase Angle Curves

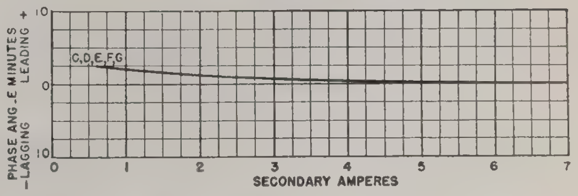


Curves Typical of Weston Potential Transformers on Page 8

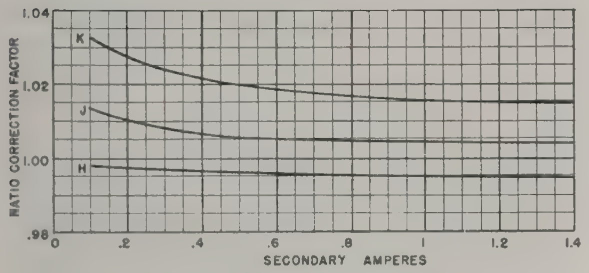
Correction Curves Typical of Weston Current Transformers at 60 CPS (Cont'd)

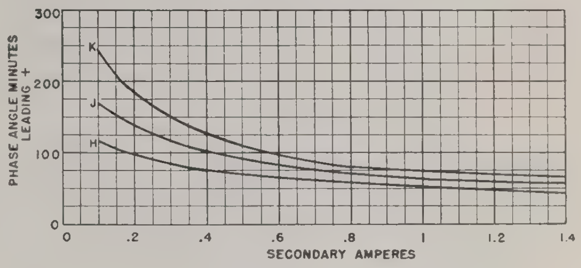
Model 327 Type 2 Current Transformers


Ratio Correction Curves


Phase Angle Curve

Model 539 Miniature Current Transformers


Ratio Correction Curves


Phase Angle Curves

CORRECTION CURVES TYPICAL of WESTON CURRENT TRANSFORMERS at 70-2500 CPS

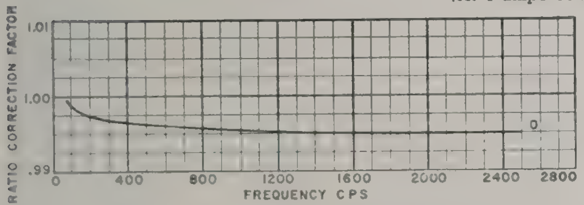
These curves apply to the binding post ranges and were taken at 80% rated current with the following burdens:

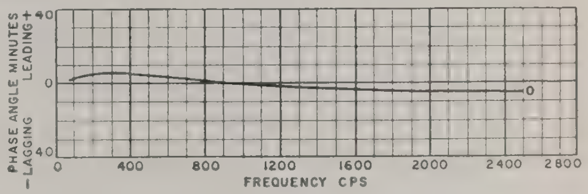
Key to Secondary Burdens at 70-2500 cycles

Curve	Burden
O	Weston Models 433 plus 432 or 904 plus 905 or 433 or 904
P	Weston Models 370 plus 310 or 370
Q	Weston Models 326 Ammeter plus Wattmeter or 326 Ammeter

Model 461 Type 1 Current Transformer

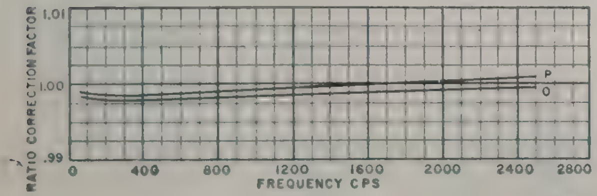
(At 4 amperes secondary current)

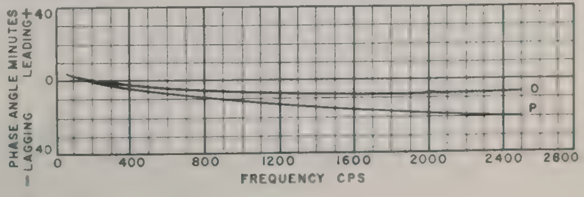

Ratio Correction Curve


Phase Angle Curve

Model 461 Type 2 Current Transformer

(At 4 amperes secondary current)


Ratio Correction Curves


Phase Angle Curves

(Cont'd next page)

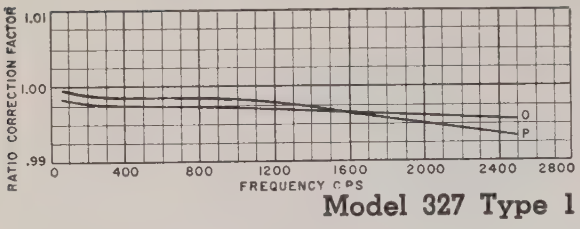
Curves Typical of Weston Potential Transformers on Page 8

Correction Curves Typical of Weston Current Transformers at 70-2500 cps

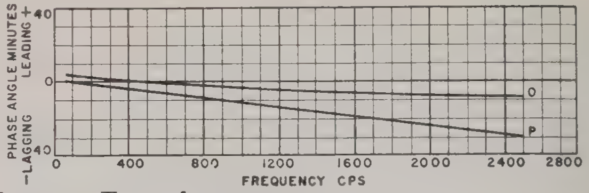
Model 461 Type 5 Current Transformer

(At 4 amperes secondary current)

Ratio Correction Curves



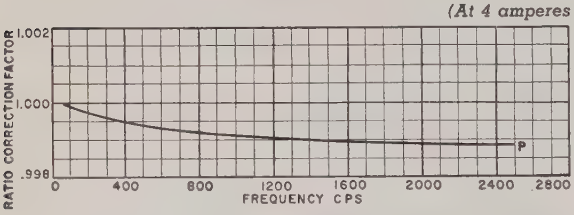
Phase Angle Curves



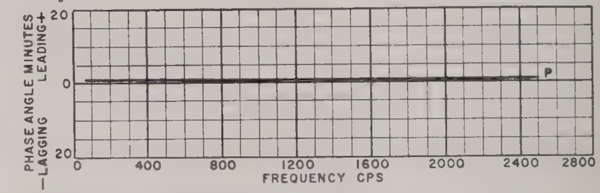
Model 327 Type 1 Current Transformer

(At 4 amperes secondary current)

Ratio Correction Curve



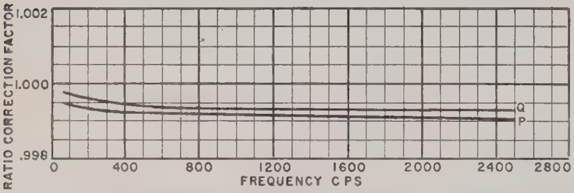
Phase Angle Curve



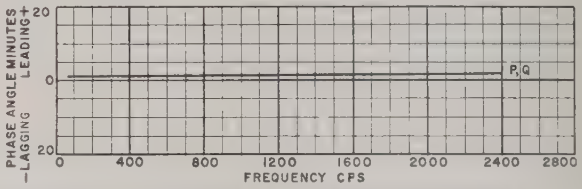
Model 327 Type 2 Current Transformer

(At 4 amperes secondary current)

Ratio Correction Curves



Phase Angle Curve



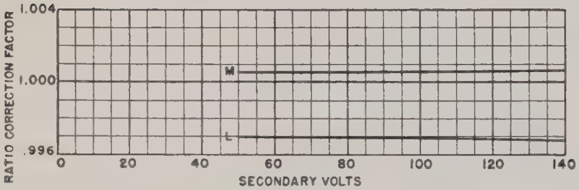
CORRECTION CURVES TYPICAL OF WESTON POTENTIAL TRANSFORMERS

Key to Secondary Burdens, at 60 cycles

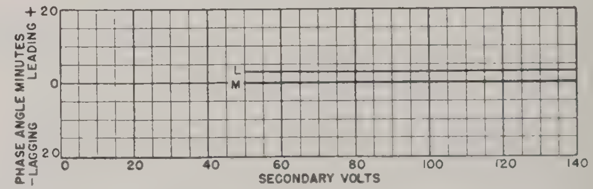
Curve	Ohms	Va	PF
L	2645	5.0	1.0
M	1058	12.5	1.0
N	529	25.0	1.0

Model 311 Type 1 Potential Transformer

Ratio Correction Curves

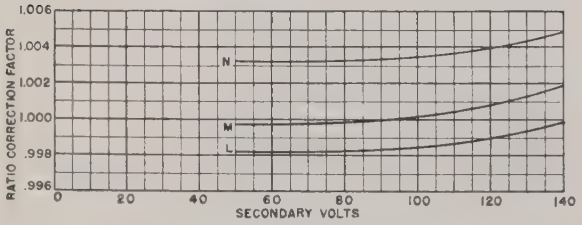


Phase Angle Curves

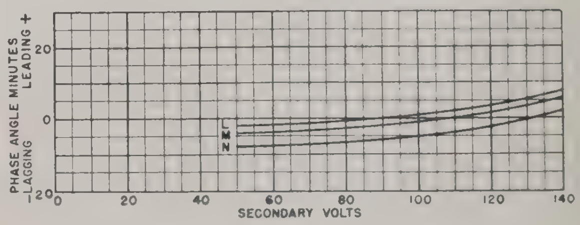


Model 311 Type 2 Potential Transformer

Ratio Correction Curves



Phase Angle Curves



WESTON INSTRUMENTS DIVISION
WESTON INSTRUMENTS, INC.
614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
a Schlumberger company

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WESTON®

PORTABLE INSTRUMENTS
A-C and D-C

PRICE LIST
06-201

Effective
JAN. 1, 1970

SUPERSEDES ISSUE
DATED 12/1/68

All Prices Subject to Change Without Notice and are F. O. B. Factory, Newark, N. J.

432 D-C AND SINGLE PHASE A-C WATTMETERS

FOR LOW POWER FACTOR USE — (25-125 CYCLES)

VOLTS MAX.	AMPERES MAX.	WATTS High Range	WATTS Low Range	SCALE DIV.	CATALOG NUMBER	PRICE
150/75	.5	15	7.5	75	432-9901012	$308.00
	1	30	15	75	432-9901016	
	2	60	30	60	432-9901017	
	5	150	75	75	432-9901018	
	10	300	150	75	432-9901019	
250/125	.2	10	5	100	432-9901020	315.00
	.4	20	10	100	432-9901021	
	1	50	25	100	432-9901022	
	2	100	50	100	432-9901023	
	4	200	100	100	432-9901024	
	10	500	250	100	432-9901025	
300/150	.2	12	6	60	432-9901026	
	.5	30	15	75	432-9901027	
	1	60	30	60	432-9901028	
	2	120	60	60	432-9901029	
	5	300	150	75	432-9901030	
	10	600	300	60	432-9901031	
150/75	1/.5	30/15	15/7.5	75	432-9902014	
	2/1	60/30	30/15	60	432-9902015	
	5/2.5	150/75	75/37.5	75	432-9902008	
	10/5	300/150	150/75	75	432-9902016	
250/125	.4/.2	20/10	10/5	100	432-9902017	333.00
	.8/.4	40/20	20/10	100	432-9902018	
	2/1	100/50	50/25	100	432-9902019	
	4/2	200/100	100/50	100	432-9902020	
	8/4	400/200	200/100	100	432-9902021	
300/150	.5/.25	30/15	15/7.5	75	432-9902022	341.00
	1/.5	60/30	30/15	60	432-9902023	
	2/1	120/60	60/30	60	432-9902024	
	5/2.5	300/150	150/75	75	432-9902009 s	
	10/5	600/300	300/150	60	432-9902010 s	

(For GENERAL USE on next page.)

s—Normally carried in stock. Do not include "s" in your order write up.

432 WATTMETERS — FOR GENERAL USE (25-125 CYCLES)

VOLTS		AMPERES		WATTS		Scale Divisions	CATALOG NUMBER	PRICE
Normal	Maximum	Normal	Max.	High Range	Low Range			
100/50	130/65	.1	.15	10	5	100	432-9901032	$296.00
		.2	.3	20	10	100	432-9901033	
		.5	.75	50	25	100	432-9901034	
		1	1.5	100	50	100	432-9901035	
		2	3	200	100	100	432-9901036	
		5	7.5	500	250	100	432-9901037	
		10	15	1 KW	0.5 KW	100	432-9901038	
		20	30	2 KW	1 KW	100	432-9901039	
		50	75	5 KW	2.5 KW	100	432-9901040	
150/75	200/100	.1	.15	15	7.5	75	432-9901041	
		.2	.3	30	15	75	432-9901042	
		.5	.75	75	37.5	75	432-9901043	
		1	1.5	150	75	75	432-9901001 S	
		2	3	300	150	75	432-9901003	
		5	7.5	750	375	75	432-9901005 S	
		10	15	1.5 KW	.75 KW	75	432-9901007	
		20	30	3 KW	1.5 KW	75	432-9901009	
		50	75	7.5 KW	3.75 KW	75	432-9901044	
200/100	260/130	.1	.15	20	10	100	432-9901045	
		.2	.3	40	20	80	432-9901046	
		.5	.75	100	50	100	432-9901047	
		1	1.5	200	100	100	432-9901048	
		2	3	400	200	80	432-9901049	
		5	7.5	1 KW	0.5 KW	100	432-9901050	
		10	15	2 KW	1 KW	100	432-9901051	
		20	30	4 KW	2 KW	80	432-9901052	
		50	75	10 KW	5 KW	100	432-9901053	
300/150	400/200	.1	.15	30	15	75	432-9901054	
		.2	.3	60	30	60	432-9901055	
		.5	.75	150	75	75	432-9901056	
		1	1.5	300	150	75	432-9901002 S	
		2	3	600	300	60	432-9901004	
		5	7.5	1.5 KW	.75 KW	75	432-9901006 S	
		10	15	3 KW	1.5 KW	75	432-9901008 S	
		20	30	6 KW	3 KW	60	432-9901010 S	
		50	75	15 KW	7.5 KW	75	432-9901011 S	
150/75	200/100	1/.5	1.5/.75	150/75	75/37.5	75	432-9902001	
		2/1	3/1.5	300/150	150/75	75	432-9902025	
		5/2.5	7.5/3.75	800/400	400/200	80	432-9902002	
		10/5	15/7.5	1500/750	750/375	75	432-9902005 S	
200/100	260/130	1/.5	1.5/.75	200/100	100/50	100	432-9902026	
		2/1	3/1.5	400/200	200/100	100	432-9902027	
		5/2.5	7.5/3.75	1000/500	500/250	100	432-9902003 S	
		10/5	15/7.5	2/1 KW	1/.5 KW	100	432-9902006	
300/150	400/200	1/.5	1.5/.75	300/150	150/75	75	432-9902028	
		2/1	3/1.5	600/300	300/150	60	432-9902029	
		5/2.5	7.5/3.75	1500/750	750/375	75	432-9902004 S	
		10/5	15/7.5	3/1.5 KW	1.5/.75 KW	75	432-9902007 S	

432 WATTMETERS FOR GENERAL USE (25-1000 CYCLES)

VOLTS		AMPERES		WATTS		Scale Divisions	CATALOG NUMBER	PRICE
Normal	Maximum	Normal	Max.	High Range	Low Range			
300/150	400/200	5/2.5	7.5/3.75	1500/750	750/375	75	432-9902013 S	$321.00
300/150	400/200	5	7.5	1.5 KW	.75 KW	75	432-9901015 S	
150/75	200/100	5	7.5	750	375	75	432-9901014	
200/100	260/130	50	75	10 KW	5 KW	100	432-9901057	

S - Normally Carried in Stock. Do Not Include "S" in Your Order Write Up.

Y-BOXES FOR MODEL 432 WATTMETERS

Normal Voltage of Instrument	Y-Box Multiplying Constant	Normal Line Voltage With Y-Box	Maximum Voltage With Y-Box	Type Box	Price
75	3	150	170	51	$75.00
150	3	300	340	52	
150	4	400	450	52	
150	5	500	550	53	
150	6	600	650	53	

All orders for Y-Boxes must give the instrument potential range with which the box will be used and the line voltage of the 3 phase system to be measured.

All orders for Y-Boxes to be used with meters already in possession of the purchaser must give the serial number of the instrument, since the box is for use with a specific instrument only.

433 A-C VOLTMETER (25-1000 CYCLES)

Range	Scale Div.	Catalog Number	Price
10	100	433-1901001	$165.00
150	150	433-1901007 s	165.00
20/10	100	433-1904001	168.00
30/15	150	433-1903003	168.00
60/30	150	433-1903005 s	168.00
150/75	150	433-1903008 s	168.00
300/150	150	433-1903010 s	168.00
450/300/150	150	433-1906005	193.00
600/300/150	150	433-1906001 s	193.00
*750/300/150	150	433-1907001 s	237.00

*Includes External Model 9990, Type 52 Box.

433 A-C VOLTMETER (25-125 CYCLES)

Range	Scale Div.	Approx. Resis. Ohms	Catalog Number	Price
† 10	100	40	433-1901002	$145.00
† 15	150	88	433-1901003	
† 30	150	335	433-1901004	
† 50	100	700	433-1901010	
† 75	150	1700	433-1901011	
† 125	125	4400	433-1901012	
† 150	150	5300	433-1901005 s	
† 250	125	18,200	433-1901008 s	
† 300	150	22,000	433-1901013	
10/5	100	24/12	433-1902011 s	147.00
20/10	100	116/58	433-1903001 s	
30/15	150	336/168	433-1903002 s	
60/30	150	850/425	433-1903004 s	
150/75	150	5300/2680	433-1903007 s	
300/150	150	22,000/11,000	433-1903009 s	
450/300/150	150	33,000/22,000/11,000	433-1905001 s	173.00
**600/300/150	150	44,000/22,000/11,000	433-1906002 s	
**750/300/150	150	55,000/22,000/11,000	433-1906003 s	

**Have extension on case to accommodate additional resistance necessary.

† Can be supplied with suppressed scale and free zero at a price of $252.00. Range of 99-135, 180-270 volts, price $255.00

433 A-C AMMETER (25-500 CYCLES)

Range	Scale Div.	Approx. Resis. Ohms	Catalog Number	Price
1	100	0.48	433-2901001 s	$136.00
1.5	150	0.20	433-2901008	
2	100	0.12	433-2901009	
3	150	0.053	433-2901010	
5	100	0.020	433-2901002 s	
10	100	0.007	433-2901004	
15	150	0.0038	433-2901005 s	
30	150	0.00063	433-2901006 s	
50	100	0.00038	433-2901007 s	
2/1	100	0.12/0.48	433-2903004 s	157.00
5/2.5	100	0.02/0.08	433-2903001 s	
10/5	100	0.0083/0.028	433-2903005 s	
20/10	100	0.004/0.0108	433-2903006 s	
3/1.5/0.75	150	0.18/0.43/0.59	433-2906002 s	216.00
5/2.5/1	100	0.13/0.26/0.37	433-2906001 s	
10/5/1	100	0.030/0.070/0.37	433-2906005 s	
10/5/2.5	100	0.030/0.060/0.075	433-2906006 s	
15/7.5/1.5	150	0.023/0.044/0.19	433-2906007 s	
20/5/2	100	0.040/0.19/0.30	433-2907001 s	
30/7.5/3	150	0.0090/0.036/0.040	433-2908001 s	
50/20/5	100	0.0084/0.0011/0.020	433-2909001 s	
50/20/10	100	0.0073/0.0080/0.010	433-2909002 s	

For Ammeters with Adjustable Pointer Stop add $14.00 to above prices.

S - Normally Carried in Stock. Do Not Include "S" in Your Order Write Up.

433 A-C AMMETER (25-1000 CYCLES)

Range	Scale Div.	Catalog Number	Price
5A	100	433-2901003	$146.00
2/1	100	433-2903007	166.00
5/2.5	100	433-2903002	166.00
10/5	100	433-2903003	166.00
5/2.5/1	100	433-2906003 s	223.00
10/5/1	100	433-2906004	223.00
50/20/5	100	433-2909003 s	223.00

433 A-C MILLIAMMETER (25-500 CYCLES)

Range	Scale Div.	Approx. Resis. Ohms	Catalog Number	Price
15	150	1850	433-4901001	$135.00
30	150	460	433-4901002 s	
75	150	78	433-4901003	
100	100	49	433-4901004	
150	150	13	433-4901005	
200	100	8.8	433-4901006	
250	125	6.0	433-4901007	
300	150	3.9	433-4901008	
400	80	2.5	433-4901009	
500	100	2.0	433-4901010 s	
600	120	1.13	433-4901011	
750	150	0.74	433-4901012	
100/50	100	74/296	433-4903004	155.00
150/75	150	30/120	433-4903005 s	
300/150	150	6.4/26	433-4903002 s	
500/250	100	1.6/6.6	433-4903006 s	

433 A-C MILLIAMMETER (25-1000 CYCLES)

Range	Scale Div.	Catalog Number	Price
100/50	100	433-4903001 s	$163.00
500/250	100	433-4903003 s	163.00

455 A-C D-C VOLTMETER (25-125 CYCLES)

Range	Scale Div.	Catalog Number	Price
20/10	100	455-1903002	$254.00
300/150	150	455-1903003 s	254.00
*300/150/75	150	455-1906003	279.00
*600/300/150	150	455-1906001	279.00
*750/300/150	150	455-1906002 s	293.00

*Extended Type Case

455 A-C D-C VOLTMETER (25-1000 CYCLES)

Range	Scale Div.	Catalog Number	Price
*300/150	150	455-1904001	$263.00

Ranges not listed but identical to Model 433 A-C Voltmeter, except for resistance, add $100.00 to Model 433 price to obtain Model 455 Price.

*Extended type case.

931 D-C VOLTMETER

Range	Scale Div.	Ohms Per Volt	Catalog Number	Price
3	150	1000	931-1901004 s	$134.00
15	150	1000	931-1901005 s	
30	150	1000	931-1901001 s	
50	100	1000	931-1901003 s	
150	150	1000	931-1901002 s	
300	150	1000	931-1901006	
30/7.5/3	150	1000	931-1905003 s	156.00
75/30/7.5	150	1000	931-1905002 s	
150/15/3	150	1000	931-1905001 s	
300/150/3	150	1000	931-1905005 s	
500/100/10	100	1000	931-1905004	
750/300/150	150	1000	931-1905006 s	
3	150	5000	931-1902002	153.00
15	150	5000	931-1902003	
30	150	5000	931-1902004	
50	100	5000	931-1902001	
150	150	5000	931-1902005	
300	150	5000	931-1902006	
30/7.5/3	150	5000	931-1906003 s	174.00
75/30/7.5	150	5000	931-1906002 s	
150/15/3	150	5000	931-1906004 s	
300/150/3	150	5000	931-1906006 s	
500/100/10	100	5000	931-1906005 s	
750/300/150	150	5000	931-1906001 s	

931 D-C MILLIAMMETER

Range	Approx. Resis. Ohms	Scale Div.	Catalog Number	Price
1	93	Blank	931-4901999 s	$125.00
1	93	100	931-4901002 s	132.00
15	1.0	150	931-4901001	132.00
150	—	150	931-4902001	132.00
3/0.3/0.03	—	150	931-4904005 s	171.00
15/1.5/0.15	—	150	931-4904004 s	171.00
150/15/1.5	—	150	931-4904003 s	153.00
1500/150/15	—	150	931-4904002 s	153.00
3000/300/30	—	150	931-4904001 s	153.00

Single Range Milliammeter with ranges above 20 MA. are shunted and have a drop of 50 MV. ± 5%.

S - Normally Carried in Stock. Do Not Include "S" in Your Order Write Up.

931 D-C MICROAMMETER

Range	Approx. Resis. Ohms	Scale Div.	Catalog Number	Price
30	2300	150	931-5901002 s	$171.00
100	2000	100	931-5901003 s	153.00
200	600	100	931-5901001 s	144.00
30	490	150	931-5902002 s	174.00
100	60	100	931-5902003 s	174.00
200	15	100	931-5902001 s	153.00

931 D-C AMMETER

Range	Scale Div.	Catalog Number	Price
**50 mv		931-2903001s	$125.00
*50 mv	100	....	138.00
*50 mv	150	....	
1	100	931-2901005	
1.5	150	931-2901004	
3	150	931-2901002	
5	100	931-2901001s	
7.5	150	931-2901006	
15	150	931-2901003 s	
30	150	931-2901007	
50	100	931-2901008	
5/0.5/0.05	100	931-2902007 s	157.00
5/2.5/0.5	100	931-2902008 s	
10/1/0.1	100	931-2902006 s	
10/5/1	100	931-2902009 s	
15/3/0.15	150	931-2902010	
15/3/1.5	150	931-2902003 s	
25/2.5/0.5	100	931-2902011	
25/10/2.5	100	931-2902012 s	
30/15/3	150	931-2902005 s	
50/5/0.5	100	931-2902013 s	
50/10/2	100	931-2902002 s	
50/20/5	100	931-2902001 s	
50/25/10	100	931-2902004 s	

*Price does not include external shunt.

**Plain scale with pencil mark at zero and full scale, no arc, division lines or numerals. Also marked (FS = 50 MV adjusted for 0.026 ohm leads). Shunt not furnished, leads only.

Self contained up to 50 amperes inclusives. Instruments beyond 50 amperes must be utilized with 50 mv. external shunts.

Leads:
Model 931 – External Shunt Ammeter –
1 pair – 40 x 30 braid covered rubber leads,
Forked Terminal both ends. 5 ft. Length –
Resistance 0.026Ω

Part No. 4516 s — Price $6.90

9959 LEATHER CARRYING CASES

For Model	Part Number	Price
*430	48532 s	$23.50
*432	48532 s	
*433	48532 s	
*455	48532 s	
*931	48532 s	
*932	48532 s	
**430	55848 s	31.50
**432	55848 s	
**433	55848 s	
***433	161310 s	
**455	55848 s	
**931	55848 s	
**932	55848 s	

*Standard Case **Extended Case ***With Pointer Stop

Models 433 & 931 – Standard Voltmeters –
Forked terminal at one end – test prod at
other end. 5 ft. Length

Part No. 254761-901 s — Price $4.15

S - Normally Carried in Stock. Do Not Include "S" in Your Order Write Up.

WESTON INSTRUMENTS DIVISION
WESTON INSTRUMENTS, INC.
614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
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WESTON®

PORTABLE INSTRUMENTS
High Sensitivity — Model 622

PRICE LIST
06-202
Effective
JAN. 1, 1970

SUPERSEDES ISSUE
DATED 12/1/68

All Prices Subject to Change Without Notice and are F. O. B. Factory, Newark, N. J.

622 D-C Voltmeter — Multi-Range (With 4 Binding Posts)

Range	Ohms Per Volt	Scale Divisions	Catalog Number	Price
75/30/7.5	1000	150	622-1961003	$432.00
150/15/3	1000	150	622-1961001	↓
300/150/3	1000	150	622-1961002	
750/300/150	1000	150	622-1961004	

622 D-C Voltmeter — Multi-Range With Range Changing Switch and 2 Binding Posts

Range	Ohms Per Volt	Scale Div.	Catalog Number	Price
300/150/75/30/15/7.5/3/1.5	1000	150	622-1962001 s	$528.00
500/200/100/50/20/10/5.2	1000	100	622-1962002	528.00
750/300/150/75/30/15/7.5/3/1.5	1000	150	622-1962003 s	550.00
1000/500/200/100/50/20/10/5/2	1000	100	622-1962004 s	550.00

622 D-C Voltmeter 200,000 Ohms/V

Range	Scale Div.	Catalog Number	Price
20/10/2/1/0.2 V	100	622-1963001	$702.00

20 RANGE D-C VOLT-MILLIAMMETER

Voltage Ranges (200 ohms per Volt):	Current Ranges	Resistance (approx.)	Catalog Number	Price
750/300/150/75/30/15/7.5/3/1.5 volts; 100/50 mv.	3000/1500/750/300/150/75/30/15/7.5 ma	0.33/0.066/0.132/1.332/0.655/1.28/3.0/5.35/8 ohms	622-9965001	$803.00

622 D-C Millivoltmeter — Multi-Range With Range Changing Switch and 2 Binding Posts

Range	Resis. Ohms	Scale Div.	Catalog Number	Price
50/20/10/5/2	250/100/50/25/10	100	622-9962002 s	$519.00
500/100/20/5/1	2,500 /500/100/25/5	100	622-9962003	↓
500/100/50/20/5	2,500 /500/250/100/25	100	622-9962005	
1000/200/50/10/1	5,000/1000/250/50/5	100	622-9962007 s	
2000/500/100/20/2	10,000/2500/500/100/10	100	622-9962008	
1000/200/50/10/2	5,000/1000/250/50/10	100	622-9962009	

622 D-C Milliammeter — Low Resis. Type With Range Changing Switch and 2 Binding Posts

Range	Resis. Ohms	Scale Div.	Catalog Number	Price
30/3/0.3/0.03	3.4/33.2/306/556	150	622-4963001	$538.00
100/10/1/0.1	0.20/1.98/18.4/40.0	100	622-4963002 s	↓
200/20/2/0.2	0.099/0.99/9.1/10	100	622-4963003	
200/20/2/0.2	10 Ohms All Ranges	100	622-4963005	
500/50/5/0.5	1.10/1.0/9.8/80	100	622-4963004 s	

622 D-C Microammeter With 2 Binding Posts (High Resis.)

Range	Approx. Resis. Ohms	Scale Divisions	Catalog Number	Price
20	2600	100	622-5962001	$439.00
30	1800	150	622-5962002	439.00
50	1100	100	622-5962003	421.00
100	600	100	622-5962004	↓
150	240	150	622-5962005	
200	175	100	622-5962006	

622 D-C Microammeter With 2 Binding Posts (Low Resis.)

Range	Approx. Resis. Ohms	Scale Divisions	Catalog Number	Price
5	4000	100	622-5961007	$494.00
10	3900	100	622-5961008	494.00
15	2600	150	622-5961009	494.00
20	280	100	622-5961003	458.00
30	150	150	622-5961004	458.00
50	90	100	622-5961001	439.00
100	45	100	622-5961002	↓
150	30	150	622-5961005	
200	10	100	622-5961006	

622 D-C Microammeter — Multi-Range With Range Changing Switch and 2 Binding Posts

Range	Resis. Ohms	Catalog Number	Price
1000/500/200/100/50	96/184/400/600/400	622-5963002 s	$519.00
1000/500/200/100/20	618/1214/2870/5160/3150	622-5963003 s	613.00
1000/500/200/100/50	100 ohms all ranges.	622-5963001 s	605.00

622 Thermo Ammeter (External Thermoelement Type)

Range	Scale Divisions	Catalog Number	Price
5	100	622-2961001	$501.00
10	100	622-2961002	↓
25	125	622-2961003	
50	100	622-2961004	

s — Normally carried in stock. Do not include "s" in your order write up.

622 Thermo Voltmeter (Plug-In Thermoelement Type)

Range	Ohms Per Volt	Scale Div.	Catalog Number	Price
20/5/2/0.5	50	100	622-1964001	$616.00
50/10/5/1	100	100	622-1964002	616.00
100/20/10/2	100	100	622-1964003	616.00
100/50/10/5	500	100	622-1964004	616.00
300/150/75 30/15	200	150	622-1964005	631.00

9997 – Spare or Replacement Thermoelements

Type	RANGES For Use With 150 Div. Scale Inst.	Price
V	1.5,7.5,15,30,75,150,300,MA.	$140.00
V-1	1.5,7.5,15,30,MA.	147.00
C	.75,1.5,3,15 Amperes	65.00
C	30 Amperes	77.00

622 Thermo Milliammeter (Plug-In Thermoelement Type)

Range	Approx. MV Drop	Scale Div.	Catalog Number	Price
1.5	2250	150	622-4961001	$546.00
2	1650	100	622-4961002	↓
7.5	300	150	622-4961003	
10	250	100	622-4961004	
50	180	100	622-4961005	
150	110	150	622-4961006	
500	110	100	622-4961007	

A low loss adapter providing direct connection to the couple is recommended for plug-in couples for frequencies above 2000 kilocycles. Price is $95.00.

9997 – Spare or Replacement Thermoelements

Type	RANGES For Use With 100 Div. Scale Inst.	Price
V	2,5,10,20,50,100,200,500,MA.	$140.00
V-1	2,5,10,20,50,MA.	147.00
C	1,2,2.5,5,10,20 Amperes	65.00
C	25,50 Amperes	77.00

When orders are placed for additional elements for use as spares or replacements, the instrument serial number and the ranges desired for the elements must be given. Specify Group 2 thermoelements for Model 622. Type C (external compensated) elements are ordinarily provided in round bakelite cases for ranges of 20 amperes or less. Rectangular cases are standard above 20 amperes.

622 A-C Rectifier Type Voltmeter

Range	Catalog Number	Price
300/150/75	622-1962005	$488.00

622 Thermo Milliammeter (Plug-In Shunted Type)
With Range Changing Switch and 2 Binding Posts

Range	Scale Div.	Approx. Res. Ohms	Catalog Number	Price
100/50/10/5	100	19.8/37/120/80	622-4964001	$647.00
500/100/20/5	100	4/19.3/80/80	622-4964002	↓
1000/200/50/10	100	.7/3.3/12.3/40	622-4964003 s	
500/200/100/50	100	.9/2.1/4.2/8	622-4964004	

Model 9959 Leather Carrying Case For 622

Part No.	Price
90675	$38.00

LEADS

External Shunt Ammeters – Model 622 – one pair, five feet long, rubber-insulated leads, 40 x 30 braid-covered. Forked terminals, both ends. Resistance 0.026 (ohms).

Part No. 4516 s . . . . **Price $6.90**

Voltmeters – Model 622 – One pair, five feet long, insulated leads, forked terminal on one end, test probe on other.

Part No. 254761 s . . **Price $4.15**

s – Normally carried in stock. Do not include "s" in your order write-up.

WESTON INSTRUMENTS DIVISION
WESTON INSTRUMENTS, INC.
NEWARK, N. J. 07114 U. S. A.
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WESTON®

PORTABLE INSTRUMENTS
High Sensitivity – Model 622

PRICE LIST
06-202
Effective
JAN. 1, 1970

SUPERSEDES ISSUE
DATED 12/1/68

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622 D-C Voltmeter – Multi-Range (With 4 Binding Posts)

Range	Ohms Per Volt	Scale Divisions	Catalog Number	Price
75/30/7.5	1000	150	622-1961003	$432.00
150/15/3	1000	150	622-1961001	↓
300/150/3	1000	150	622-1961002	
750/300/150	1000	150	622-1961004	

622 D-C Voltmeter – Multi-Range With Range Changing Switch and 2 Binding Posts

Range	Ohms Per Volt	Scale Div.	Catalog Number	Price
300/150/75/30/15/7.5/3/1.5	1000	150	622-1962001 s	$528.00
500/200/100/50/20/10/5.2	1000	100	622-1962002	528.00
750/300/150/75/30/15/7.5/3/1.5	1000	150	622-1962003 s	550.00
1000/500/200/100/50/20/10/5/2	1000	100	622-1962004 s	550.00

622 D-C Voltmeter 200,000 Ohms/V

Range	Scale Div.	Catalog Number	Price
20/10/2/1/0.2 V	100	622-1963001	$702.00

20 RANGE D-C VOLT-MILLIAMMETER

Voltage Ranges (200 ohms per Volt):	Current Ranges	Resistance (approx.)	Catalog Number	Price
750/300/150/75/30/15/7.5/3/1.5 volts; 100/50 mv.	3000/1500/750/300/150/75/30/15/7.5 ma	0.33/0.066/0.132/1.332/0.655/1.28/3.0/5.35/8 ohms	622-9965001	$803.00

622 D-C Millivoltmeter – Multi-Range With Range Changing Switch and 2 Binding Posts

Range	Resis. Ohms	Scale Div.	Catalog Number	Price
50/20/10/5/2	250/100/50/25/10	100	622-9962002 s	$519.00
500/100/20/5/1	2,500/500/100/25/5	100	622-9962003	↓
500/100/50/20/5	2,500/500/250/100/25	100	622-9962005	
1000/200/50/10/1	5,000/1000/250/50/5	100	622-9962007 s	
2000/500/100/20/2	10,000/2500/500/100/10	100	622-9962008	
1000/200/50/10/2	5,000/1000/250/50/10	100	622-9962009	

622 D-C Milliammeter – Low Resis. Type With Range Changing Switch and 2 Binding Posts

Range	Resis. Ohms	Scale Div.	Catalog Number	Price
30/3/0.3/0.03	3.4/33.2/306/556	150	622-4963001	$538.00
100/10/1/0.1	0.20/1.98/18.4/40.0	100	622-4963002 s	↓
200/20/2/0.2	0.099/0.99/9.1/10	100	622-4963003	
200/20/2/0.2	10 Ohms All Ranges	100	622-4963005	
500/50/5/0.5	1.10/1.0/9.8/80	100	622-4963004	

622 D-C Microammeter With 2 Binding Posts (High Resis.)

Range	Approx. Resis. Ohms	Scale Divisions	Catalog Number	Price
20	2600	100	622-5962001	$439.00
30	1800	150	622-5962002	439.00
50	1100	100	622-5962003	421.00
100	600	100	622-5962004	↓
150	240	150	622-5962005	
200	175	100	622-5962006	

622 D-C Microammeter With 2 Binding Posts (Low Resis.)

Range	Approx. Resis. Ohms	Scale Divisions	Catalog Number	Price
5	4000	100	622-5961007	$494.00
10	3900	100	622-5961008	494.00
15	2600	150	622-5961009	494.00
20	280	100	622-5961003	458.00
30	150	150	622-5961004	458.00
50	90	100	622-5961001	439.00
100	45	100	622-5961002	↓
150	30	150	622-5961005	
200	10	100	622-5961006	

622 D-C Microammeter – Multi-Range With Range Changing Switch and 2 Binding Posts

Range	Resis. Ohms	Catalog Number	Price
1000/500/200/100/50	96/184/400/600/400	622-5963002 s	$519.00
1000/500/200/100/20	618/1214/2870/5160/3150	622-5963003 s	613.00
1000/500/200/100/50	100 ohms all ranges.	622-5963001 s	605.00

622 Thermo Ammeter (External Thermoelement Type)

Range	Scale Divisions	Catalog Number	Price
5	100	622-2961001	$501.00
10	100	622-2961002	↓
25	125	622-2961003	
50	100	622-2961004	

s – Normally carried in stock. Do not include "s" in your order write up.

622 Thermo Voltmeter (Plug-In Thermoelement Type)

Range	Ohms Per Volt	Scale Div.	Catalog Number	Price
20/5/2/0.5	50	100	622-1964001	$616.00
50/10/5/1	100	100	622-1964002	616.00
100/20/10/2	100	100	622-1964003	616.00
100/50/10/5	500	100	622-1964004	616.00
300/150/75 30/15	200	150	622-1964005	631.00

622 Thermo Milliammeter (Plug-In Thermoelement Type)

Range	Approx. MV Drop	Scale Div.	Catalog Number	Price
1.5	2250	150	622-4961001	$546.00
2	1650	100	622-4961002	↓
7.5	300	150	622-4961003	
10	250	100	622-4961004	
50	180	100	622-4961005	
150	110	150	622-4961006	
500	110	100	622-4961007	

A low loss adapter providing direct connection to the couple is recommended for plug-in couples for frequencies above 2000 kilocycles. Price is $95.00.

622 Thermo Milliammeter (Plug-In Shunted Type)

With Range Changing Switch and 2 Binding Posts

Range	Scale Div.	Approx. Res. Ohms	Catalog Number	Price
100/50/10/5	100	19.8/37/120/80	622-4964001	$647.00
500/100/20/5	100	4/19.3/80/80	622-4964002	↓
1000/200/50/10	100	.7/3.3/12.3/40	622-4964003 s	
500/200/100/50	100	.9/2.1/4.2/8	622-4964004	

9997 – Spare or Replacement Thermoelements

Type	RANGES For Use With 150 Div. Scale Inst.	Price
V	1.5,7.5,15,30,75,150,300,MA.	$140.00
V-1	1.5,7.5,15,30,MA.	147.00
C	.75,1.5,3,15 Amperes	65.00
C	30 Amperes	77.00

9997 – Spare or Replacement Thermoelements

Type	RANGES For Use With 100 Div. Scale Inst.	Price
V	2,5,10,20,50,100,200,500,MA.	$140.00
V-1	2,5,10,20,50,MA.	147.00
C	1,2,2.5,5,10,20 Amperes	65.00
C	25,50 Amperes	77.00

When orders are placed for additional elements for use as spares or replacements, the instrument serial number and the ranges desired for the elements must be given. Specify Group 2 thermoelements for Model 622. Type C (external compensated) elements are ordinarily provided in round bakelite cases for ranges of 20 amperes or less. Rectangular cases are standard above 20 amperes.

622 A-C Rectifier Type Voltmeter

Range	Catalog Number	Price
300/150/75	622-1962005	$488.00

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Part No.	Price
90675	$38.00

LEADS

External Shunt Ammeters – Model 622 – one pair, five feet long, rubber-insulated leads, 40 × 30 braid-covered. Forked terminals, both ends. Resistance 0.026 (ohms).

Part No. 4516 s . . . . **Price $6.90**

Voltmeters – Model 622 – One pair, five feet long, insulated leads, forked terminal on one end, test probe on other.

Part No. 254761 s . . **Price $4.15**

s – Normally carried in stock. Do not include "s" in your order write-up.

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NEWARK, N. J. 07114 U. S. A.
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prime source for precision ...since 1888

MODEL 901 GROUP

A-C AND D-C PORTABLE

AMMETERS, VOLTMETERS, WATTMETERS

STANDARDS PORTABLES

06-203-I

APRIL 1968

THIS matched group of portable instruments is recommended for general testing where long, easily read scales and high shielding are desired. Enclosed in ribbed molded cases, they are modern in design and feature a curved, shadow reducing, wide angle window. The window is clear, non-breakable and specially treated against electrostatic effects. Long 5½" hand calibrated mirror scales, combined with knife edge pointers, eliminate parallax errors.

Both the a-c and the d-c instruments are shielded from external magnetic fields. In the d-c instruments, a new self-shielding mechanism provides such high protection that the magnetic field created by a conductor carrying 7,000 amperes at a distance of three feet from the instrument would cause an error of less than ½ of 1% of full scale value. In fact, the external field error encountered in these instruments is less than that allowed in the American Standard for Electrical Indicating Instruments (ASA, C39.1-1964) for a ¼% Portable, even though subjected to test conditions three times as severe.

These instruments are adjusted for use in the horizontal position and must be used in this position for best accuracy.

MODEL 901 D-C INSTRUMENTS

Rated Accuracy, horizontal position
0.5% of full scale value..............................Scale 5.5" (139.7 mm)
Type: Self-Shielded Permanent Magnet Moving Coil
(Shielded from External Magnetic Fields)

Size { 7½ x 7¼ x 3⅝" / 190 x 184 x 92 mm — Approx. Weight { 3¾ lbs. / 1.7 kgs.

Temperature: Standardized at an ambient temperature of 25C (77F). The temperature influence for these instruments will not exceed 0.5% for a change of ±10C in the ambient temperature.

D-C Voltmeters

Normally supplied in sensitivities of 1000 or 5000 ohms per volt in selected single to four range combinations on 2 to 5 binding posts, respectively. Available up to 10 ranges with 2 binding posts and range changing switch. Maximum self-contained range 1000 volts.

Range	Scale Div.	Range	Scale Div.
0.2-0-2.8	150	500/100/10	100
1.5	150	750/300/150	150
150	150	1000/500/200	100
150/15/3	150	†*750/300/150 75/30/15/3	150
150/75/15	150		
300/150/3	150		

*¼% Accuracy †5000 ohms per volt.

MODEL 904 MULTI RANGE

D-C Volt-Ammeters

750/300/150 Volts (200 ohms/volt) and 50 mv. Ampere ranges obtained with external shunts of ranges required and 5' leads having total resistance of 0.065 ohms.

D-C Ammeters

Self-contained up to and including 50 amperes in single or triple range combinations. Available up to 9 ranges with 2 binding posts and range changing switch, where maximum range is 3 amperes. Also available for use with external 50 mv shunts and 5-foot leads.

Range	Scale Div.	Range	Scale Div.
5	100	15/7.5/3	150
50	100	20/10/2	100
2/1/.5	100	30/7.5/1.5	150
5/2/1	100	50/25/10	100
10/5/1	100	*50MV/20/5/2	100

*¼% Accuracy.

D-C Milliammeters

Available up to 9 ranges with 2 binding posts and range changing switch. Maximum of 4 ranges on 5 binding posts.

Range	Scale Div.	Approx. Res. Ohms
100μa	100	980
200μa	100	900
500μa	100	480
1	100	95
100	100	.52
300	150	.170
30/7.5/1.5	150	3.3/12/23
150/15/1.5	150	.67/6.3/22.4
750/300/30	150	.067/.168/1.68
1500/150/15	150	.033/.322/2.22
•1000/500/200/100/50/20/10	100	.049/.099/.244/.475/.9/1.88/2.5
•100/50/20/10/5/2/1	100	1.49/2.96/7.28 14.1/26.4/52.5/60

•¼% Accuracy

Certificate for 1/4% accuracy instruments provided when called for on Purchase Order.

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MODEL 904 A-C INSTRUMENTS

Rated Accuracy, horizontal position
0.5% of full scale value..Scale 5.5" (139.7 mm)
Type: Radial Vane, Moving Iron
(Shielded from External Magnetic Fields)
Size { 7½ x 7¼ x 3⅝" / 190 x 184 x 92 mm   Approx. Weight { 4¾ lbs. / 2.15 kgs.

These instruments use a radial iron vane mechanism designed to withstand large overloads and abuse without damage or change in accuracy. Connections are made directly to the field coil in ammeters and milliammeters. Voltmeters use precision resistors made of manganin wire wound on mica sheets in series with the field coil. The resistor sheets are tapped to provide double and triple range instruments. No internal transformers are used since they add inaccuracies which may cause errors for other than ideal conditions of measurement.

These basic instruments are preferred where alternating currents and voltages are to be measured to within 0.5% accuracy. They provide the lowest power consumption (loss) combined with small temperature and frequency errors over wide ranges. True RMS measurement will be obtained even though harmonics are present in the measured waveforms and where direct current is present in the a-c wave.

All instruments are shielded from the effects of external magnetic fields by several layers of silicon steel wrapped around the mechanism. Additional laminated silicon steel covers close the ends to form a complete, effective magnetic shield.

Power Consumption: 5 ampere range at 5 amperes, 60 cycles—0.33 watt, 0.39 volt-ampere.

Frequency Rating: Calibrated on 60 cycles within its rated accuracy and is usable over a span of 25-500 cycles.

Frequency Error: From the calibrated frequency of 60 cycles, the frequency error is negligible to 25 and 100 cycles, and less than .25% of full scale value to 500 cycles.

Ammeters

Frequency Compensation: *25-1000 cycles*—All ranges can be frequency compensated from 25-1000 cycles. The frequency error is negligible from the calibrated frequency of 60 cycles to 25 and 500 cycles, and less than .25% of full scale value to 1000 cycles.

Voltmeters

Frequency Compensation: *25-500 cycles*—Ranges of 7.5 volts or higher can be frequency compensated from 25-500 cycles. The frequency error is negligible from the calibrated frequency of 60 cycles to 25 and 250 cycles, and less than .25% of full scale value to 500 cycles. *25-1000 cycles*—Single or double ranges of 15 volts or higher can be frequency compensated from 25-1000 cycles. The frequency error is negligible from the calibrated frequency of 60 cycles to 25 and 500 cycles, and less than .25% of full scale value to 1000 cycles. A non-locking contact key is supplied in the high-range of double range instruments, since this range is for intermittent duty only.

Temperature: Standardized at an ambient temperature of 25C (77F). The temperature influence is less than 0.2% of full scale value for a change of ±10C in ambient temperature.

Rating: Higher current ranges are obtained by using a 5 ampere instrument in conjunction with a Model 461 Current Transformer. Double ranges are supplied with a range changing switch and are limited to a range ratio of 2:1. The lowest practical range is 15 milliamperes.

A-C Voltmeter

Range	Scale Divisions	Approx. Res. Ohms
300/150	150	13600/6800
300/150/75	150	6800/3400/1700
† 750/300/150	150	34000/13600/6800
†600/300/150	150	27200/13600/6800

† Supplied with non-locking key in high range. This high range for intermittent duty only.

A-C Ammeters

Range	Scale Divisions	Approx. Res. Ohms	Approx. Inductance Milli-Henries
5	100	0.015	0.023
5/2.5	100	0.011/0.039	0.027/0.11

A-C Milliammeters

Range	Scale Divisions	Approx. Res. Ohms	Approx. Inductance Milli-Henries
15	150	2200	3300
30	150	580	915
50	100	142	230
150	150	16	32
500	100	1.1	2.3
750	150	0.52	1.1
150/75	150	16/64	28/112
300/150	150	4/16	7/28
300/150 (25-1000 cycles)	150	4/16	7/28

MODEL 904 MULTI-RANGE A-C INSTRUMENTS

With Self-Contained Transformers

Rated Accuracy, horizontal position, 0.5% of full scale value..Scale 5.5" (139.7 mm)
Type: Radial Vane, Moving Iron with Self-Contained Transformer
(Shielded from External Magnetic Fields)
Size { 7½ x 7¼ x 3⅝" / 190 x 184 x 92 mm

These instruments are designed for uses where it is desirable to have only one instrument rather than several of the standard type in order to provide sufficient range coverage. For normal use in the laboratory, the standard type is recommended due to its ability to make more accurate measurements under the most severe conditions. For example, any direct current present in the a-c wave may saturate the transformer and cause large errors in the reading of the transformer type instrument. On the other hand the standard type will read the true RMS value of the wave.

Double and triple and multi-range voltmeters and ammeters can be supplied in many ranges and range combinations. Double range voltmeters can generally be frequency compensated to 1000 cps with less than .25% frequency error above 500 cps.

All ammeter ranges can be compensated from 50-1000 cps. with a negligible error from 60 cps to 25 and 500 cps and less than .25% of full scale value to 1000 cps. Information pertaining to ranges, frequency compensation, temperature errors, and power consumption is available upon request.

Eight Range A-C Voltmeter

Ranges: 750/300/150/75/30/15/7.5/3 volts (on insulated binding post).

Approximate Impedance in Ohms at 60 Cycles: 117,500/18,400/5,180/1,145/182/46/11.1/1.76 ohms.

Scale: 150 divisions, figured for ranges of 750/150/30 volts.

Frequency Rating: Calibrated on 60 cycles within its rated accuracy and is compensated over a span of 50-450 cycles.

Frequency Error: From the calibrated frequency of 60 cycles, the frequency error is negligible from 50 to 125 cycles, and less than 1% of full scale value to 450 cycles. Cannot be provided for frequencies below 50 cps nor above 450 cps.

Sustained Operation: For rated accuracy on the 300 volt range, use intermittently only. One-half hour in operation can cause an additional ¾% error.

Temperature: Standardized at an ambient temperature of 25C (77F). The temperature influence for all ranges is less than .65% of full scale value for a change of ±10C in the ambient temperature.

For rated accuracy on lower ranges use heavy leads with a total R = 0.026 ohm.

Approx. Wt.: 7⅓ lbs. (3.32 kgs.)

Seven Range A-C Ammeter

Ranges: 200/100/50/20/10/5/2 amperes. (200/100/50 amps on binding posts; 20/10/5/2 amps through a switch).

Approximate Impedances in Ohms at 60 Cycles: .00019/.00025/.00044/.0058/.019/.076/.47.

Scales: 100 divisions, figured for ranges of 20/10/5 amperes.

Frequency Ratings: Calibrated on 60 cycles within its rated accuracy and is usable over a span of 25-1000 cycles.

Frequency Error: From the calibrated frequency of 60 cycles, the frequency error is negligible from 40 to 500 cycles, and less than .5% of full scale value from 25 to 40 cycles and from 500 to 1000 cycles.

Temperature: Standardized at an ambient temperature of 25C (77F). The temperature influence is less than 0.2% of full scale value for a change of ±10C in the ambient temperature.

Weight: 6⅓ lbs. (2.87 kgs.)

Six Range A-C Ammeter

Ranges: 50/20/10/5/2/1 amperes.

Approximate Impedances in Ohms at 60 Cycles: .0014/.0055/.014/.058/.28/1.1

Scale: 100 divisions, figured for ranges of 50/20/10 amperes.

Frequency Ratings: Calibrated on 60 cycles within its rated accuracy and is usable over a span of 25-1000 cycles.

Frequency Error: From the calibrated frequency of 60 cycles, the frequency error is negligible from 50 to 125 cycles, and less than 0.3% of full scale value from 25 to 50 cycles and from 125 to 1000 cycles.

Temperature: Standardized at an ambient temperature of 25C (77F). The temperature influence is less than 0.2% of full scale value for a change of ±10C in the ambient temperature.

Weight: 5¾ lbs. (2.61 kgs.)

MODEL 901 A-C RECTIFIER TYPE INSTRUMENTS

Model 901 can be adapted for measurement of alternating current by addition of an appropriate rectifier, and supplied as a voltmeter, milliammeter or microammeter. The rectifier type instrument inherently indicates average values, but can be calibrated, in terms of average or rms value of a sine wave. Most applications are special and should receive engineering consideration.

In the magnetic testing of iron samples as in the Epstein test, the maximum flux values are represented by the average values of the induced voltage. For such requirements Model 901 is available as a three range voltmeter with ranges of 75/150/300 volts, and an rms calibration. Well compensated for temperature, its accuracy is 0.5% of full scale value from 15 to 30°C. on a sine wave when using silicon diode type and 1.5% when using copper oxide type.

MODEL 905 A-C AND D-C SINGLE PHASE WATTMETERS

Rated Accuracy, horizontal position
0.5% of full scale value..................................Scale 5.5" (139.7 mm)
Type: Electrodynamometer
(Shielded from External Magnetic Fields)
Approx. Size 7½ x 7¼ x 3⅝" / 190 x 184 x 92 mm   Approx. Weight 5 lbs. / 2.27 kgs.

Power Consumption: Potential circuit at 115 volts, 60 cycles—2.7 watts, 2.7 volt-amperes. Current circuit at 5 amperes, 60 cycles—0.81 watt, 0.83 volt-ampere.

Frequency: Normally supplied for direct current and 25 to 60 cycle use. The frequency influence is negligible (less than ¼ rated accuracy) from direct current to 60 cycles and less than 0.2% of full scale value to 100 cycles for the ranges listed.

Frequency compensation for 25 to 1000 cycles can be provided in which case the frequency influence is negligible from direct current to 100 cycles and less than 0.25% of full scale value to 1000 cycles.

All of the above values apply at 50% power factor. At higher power factors the errors decrease. The instrument may be used at lower power factor with slightly increased errors.

Temperature: Standardized at an ambient temperature of 25C (77F). The temperature influence is less than 0.25% of full scale value for a change of ±10C in ambient temperature for the ranges listed.

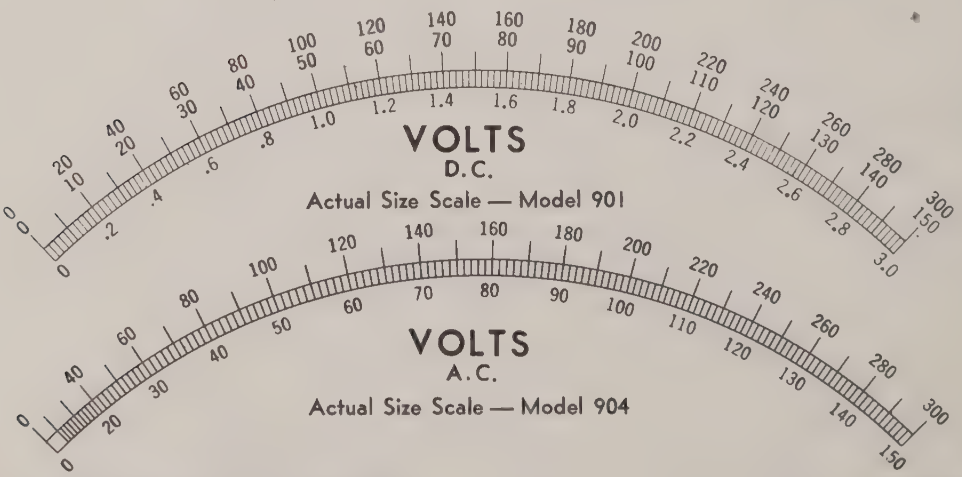
Ranges: Normally supplied with two self-contained voltage ranges and one or two current ranges. Potential ranges are selected by connecting to the binding posts marked with the range desired. Double current range instruments are supplied with a switch marked "High" and "Low" signifying high and low current ranges.

Range Extension: The current range can be extended by means of current transformers. A Model 461 type 2 or type 5 current transformer is recommended for use with a wattmeter having a current rating of 5 amperes.

The potential ranges can be extended by means of potential transformers such as the Model 311 used with an instrument having a voltage range within the span of 100 to 150 volts. For voltages less than 750 volts a multiplier may be used, but for higher voltages it is safer to use both current and potential transformers since then only a low voltage is applied to the instrument.

Low Power Factor Adjustment: Where load power factor is below approx. 40%, instruments can be supplied adjusted for a full scale range equal to 0.25 times (25% pf) the maximum current and voltage rating. Loads of approx. 40% pf or higher do not require this special adjustment, since the standard instrument can be used by utilizing the 100% overload feature of the current circuit.

Volts		Amperes		Watts		
Normal	Max.	Normal	Max.	High Range	Low Range	Scale Div.
100/50	150/75	25	50	2.5 KW	1.25 KW	125
		10	20	1 KW	.5 KW	100
		5	10	500	250	100
		2	4	200	100	100
		1	2	100	50	100
		.5	1	50	25	100
		.2	.4	20	10	100
		.1	.2	10	5	100
200/100	300/150	25	50	5 KW	2.5 KW	100
		10	20	2 KW	1 KW	100
		5	10	1 KW	.5 KW	100
		2	4	400	200	100
		1	2	200	100	100
		.5	1	100	50	100
		.2	.4	40	20	100
		.1	.2	20	10	100
100/50	150/75	10/5	20/10	1000/500	500/250	100
		5/2.5	10/5	500/250	250/125	125
		2/1	4/2	200/100	100/50	100
		1/.5	2/1	100/50	50/25	100
		.5/.25	1/.5	50/25	25/12.5	125
		.2/.1	.4/.2	20/10	10/5	100
200/100	300/150	10/5	20/10	2/1 KW	1/.5 KW	100
		5/2.5	10/5	1000/500	500/250	100
		2/1	4/2	400/200	200/100	100
		1/.5	2/1	200/100	100/50	100
		.5/.25	1/.5	100/50	50/25	100
		.2/.1	.4/.2	40/20	20/10	100



Actual Size Scale — Model 901

Actual Size Scale — Model 904

Y-Boxes For Model 905 Wattmeters

A Model 905 single phase a-c wattmeter can be used to measure the power in a balanced 3 phase, 3 wire system by means of external Y-Boxes.

All orders for Y-Boxes must give the instrument potential range with which the box will be used and the line voltage of the 3 phase system to be measured.

Normal Voltage of Instrument	Y-Box Multi Constant	Normal Line Voltage With Y-Box	Maximum Voltage With Y-Box	Type Box
50	3	100	130	51
100	3	200	260	53
100	4	250	350	21
100	5	300	430	21
100	6	400	520	21
100	8	500	700	22

WESTON INSTRUMENTS DIVISION, WESTON INSTRUMENTS, INC., NEWARK, N. J. 07114

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WESTON®

PORTABLE INSTRUMENTS
Model 901 Group

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All Prices Subject to Change Without Notice and are F. O. B. Factory, Newark, N. J.

901 D-C VOLTMETER

Range	Scale Div.	Ohms Per Volt	CATALOG NUMBER	Price
0.2-0-2.8	150	1000	901-1901001	$232.00
1.5	150	1000	901-1901002	↓
150	150	1000	901-1901003	↓
150/15/3	150	1000	901-1903002	255.00
150/75/15	150	1000	901-1903003	↓
300/150/3	150	1000	901-1903004	↓
500/100/10	100	1000	901-1903006	↓
750/300/150	150	1000	901-1903001	271.00
1000/500/200	100	1000	901-1903005	271.00
0.2-0-2.8	150	5000	901-1904007	$255.00
1.5	150	5000	901-1904008	↓
150	150	5000	901-1904009	↓
150/15/3	150	5000	901-1904002	271.00
150/75/15	150	5000	901-1904005	↓
300/150/3	150	5000	901-1904001	↓
500/100/10	100	5000	901-1904004	↓
750/300/150	150	5000	901-1904006	↓
*750/300/150				287.00
75/30/15/3	150	5000	901-1905001 s	281.00
1000/500/200	100	5000	901-1905003	287.00

*1/4% Accuracy.

Model 901 – D-C Volt-Ammeters

30/3/150 Volts (200 ohms/volt) and 50 mv. Ampere ranges obtained with external shunts of ranges required. Price less shunts but with 5' leads. $246.00

901 D-C MILLIAMMETER

Range	Scale Div.	Approx. Resis. Ohms	CATALOG NUMBER	Price
100 Mics.	100	980	901-5901002	$248.00
200 Mics.	100	900	901-5901003	241.00
500 Mics.	100	480	901-5901001	241.00
1 MA.	100	95	901-4901001	232.00
100 MA.	150	.5	901-4902002	232.00
300 MA.	150	.170	901-4902001	232.00
30/7.5/1.5 MA.	150	3.3/12/23	901-4903001	255.00
150/15/1.5 MA.	150	.67/6.3/22.4	901-4904003	255.00
750/300/30 MA.	150	.067/.168/1.68	901-4904002	255.00
1500/150/15	150	.033/.322/2.22	901-4904001	255.00
*1000/500/200/100/50/20/10	100	.049/.099/.244/.475/.9/1.88/2.5	901-4905001 s	$265.00
*100/50/20/10/5/2/1	100	1.49/2.96/7.28/14.1/26.4/52.5/60	901-4905002 s	265.00
1 MA.	Blank		901-4901999S	227.00

*1/4% Accuracy.

S - Normally carried in stock. Do not include "s" in your order write-up.

901 D-C AMMETER

Range	Scale Div.	CATALOG NUMBER	Price
5	100	901-2901001	$241.00
50	100	901-2901002	241.00
2/1/.5	100	901-2903004	255.00
5/2/1	100	901-2903005	↓
10/5/1	100	901-2903003	↓
15/7.5/3	150	901-2903007	↓
20/10/2	100	901-2903006	↓
30/7.5/1.5	150	901-2903001	↓
50/25/10	100	901-2903002	↓
*50MV/20 5/2 AMPS	100	901-2904001 s	255.00
50MV	Blank	901-2903008 s	210.00

Available for use with external 50 mv. shunts and 5 foot leads. Add price of shunt to base price of $241.00.

*1/4% Accuracy.

901 A-C RECTIFIER TYPE VOLTMETER

Range	Ohms Per Volt	CATALOG NUMBER	Price
300/150/75	1000	902-1902001	$377.00

904 A-C AMMETER

Range	Scale Div.	Approx. Resis. Ohms	CATALOG NUMBER	Price
5	100	0.015	904-2901001 s	$241.00
5/2.5	100	0.011/0.039	904-2902002	271.00

904 (7 RANGE) A-C AMMETER

Range	Scale Div.	Approx. Resis. in Ohms	CATALOG NUMBER	Price
200/100/50/20/10/5/2	100	.00019/.00025 .00044/.0058 .019/.076/.47.	904-2905001 s	$342.00

904 (6 RANGE) A-C AMMETER

Range	Scale Div.	Approx. Resis. Ohms	CATALOG NUMBER	Price
50/20/10/5/2/1	100	.0014/.0055/.014/.058/.28/1.1	904-2905002 s	$332.00

904 (8 RANGE) A-C VOLTMETER

Range	Scale Div.	Approx. Resis. in Ohms	CATALOG NUMBER	Price
750/300/150/75/30/15/7.5/3	150	117,500/18,400/5180/1145/182/46/11.1/1.76	904-1906001 s	$381.00

904 A-C MILLIAMETER

Range	Scale Div.	Approx. Resis. Ohms	CATALOG NUMBER	Price
15	150	2200	904-4901003	$241.00
30	150	580	904-4901004	↓
50	100	142	904-4901005	
150	150	16	904-4901001	
500	100	1.1	904-4901002	
750	150	0.52	904-4901006	
150/75	150	16/64	904-4902001 s	273.00
300/150	150	4/16	904-4902003	273.00

904 A-C VOLTMETER

Range	Scale Div.	Approx. Resis. In Ohms	CATALOG NUMBER	Price
300/150	150	13600/6800	904-1903001 s	$230.00
300/150/75	150	6800/3400/1700	904-1904001	248.00
†600/300/150	150	27200/13600/6800	904-1904003 s	248.00
†750/300/150	150	34000/13600/6800	904-1904005 s	248.00

†Supplied with non-locking key in high range.
This high range for intermitted duty only.

905 A-C (25-60 CYCLES) AND D-C SINGLE PHASE WATTMETER

Volts		Amperes		Watts		Scale Div.	CATALOG NUMBER	Price
Normal	Max.	Normal	Max.	High Range	Low Range			
100/50	150/75	25	50	2.5 KW	1.25 KW	125	905-6901016	$304.00
		10	20	1 KW	.5 KW	100	905-6901015	↓
		5	10	500	250	100	905-6901014	
		2	4	200	100	100	905-6901013	
		1	2	100	50	100	905-6901012	
		.5	1	50	25	100	905-6901011	
		.2	.4	20	10	100	905-6901010	
		.1	.2	10	5	100	905-6901009	
200/100	300/150	25	50	5 KW	2.5 KW	100	905-6901004 s	
		10	20	2 KW	1 KW	100	905-6901002	
		5	10	1 KW	.5 KW	100	905-6901001 s	
		2	4	400	200	100	905-6901003	
		1	2	200	100	100	905-6901005	
		.5	1	100	50	100	905-6901006	
		.2	.4	40	20	100	905-6901007	
		.1	.2	20	10	100	905-6901008	
100/50	150/75	10/5	20/10	1000/500	500/250	100	905-6902003	$327.00
		2/1	4/2	200/100	100/50	100	905-6902004	↓
		5/2.5	10/5	500/250	250/125	125	905-6902005	
		1/.5	2/1	100/50	50/25	100	905-6902006	
		.5/.25	1/.5	50/25	25/12.5	125	905-6902007	
		.2/.1	.4/.2	20/10	10/5	100	905-6902008	
200/100	300/150	10/5	20/10	2/1 KW	1/.5 KW	100	905-6902001 s	
		5/2.5	10/5	1000/500	500/250	100	905-6902002 s	
		2/1	4/2	400/200	200/100	100	905-6902009	
		1/.5	2/1	200/100	100/50	100	905-6902010	
		.5/.25	1/.5	100/50	50/25	100	905-6902011	
		.2/.1	.4/.2	40/20	20/10	100	905-6902012	

s – Normally carried in stock. Do not include "s" in your order write-up.

Y-BOXES FOR MODEL 905 WATTMETERS

All orders for Y-Boxes must give the Instrument potential range with which the box will be used and the line voltage of the 3 phase system to be measured.

All orders for Y-Boxes to be used with meters already in possession of the purchaser must give the serial number of the instrument, since the box is for use with a specific instrument only.

Normal Voltage of Instrument	Y-Box Multi Constant	Normal Line Voltage With Y-Box	Maximum Voltage With Y-Box	Type Box	Price
50	3	100	130	51	$75.00
100	3	200	260	53	↓
100	4	250	350	21	
100	5	300	430	21	
100	6	400	520	21	
100	8	500	700	22	

LEADS

Model 9958
External Shunt Ammeters – Model 901 – one pair of five foot 40 x 30 braid rubber covered leads with forked terminals – both ends having 0.026 Ω Resistance. Part No. 4516 - Price $6.90

Model 9995
Voltmeters – Model 901-904. Forked terminal at one end, test prod on other – 5 Feet long – Part No. 254761-901 - Price $4.15

LEATHER CARRYING CASES FOR MODELS 901, 902, 904 & 905 . . . . $33.00

All Orders for Carrying Cases must give the Model Number, type and range of the instrument for which it is intended.

s – Normally carried in stock. Do not include "s" in write-up of your order.

WESTON INSTRUMENTS DIVISION
WESTON INSTRUMENTS, INC.
614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
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SMALL PORTABLE
INSTRUMENTS
GALVANOMETERS

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SUPERSEDES ISSUE
DATED 12/1/68

All Prices Subject to Change Without Notice and are F. O. B. Factory, Newark, N. J.

281 D-C VOLTMETER

Approx. Resis. – 1000 Ohms Per Volt			
Range	Scale Div.	Catalog Numbers	Price
1.5	75	281-1961004	$ 73.00
3	60	281-1961001 s	↓
7.5	75	281-1961005	
10	50	281-1961006	
15	75	281-1961002	
50	50	281-1961007	
75	75	281-1961008	
150	75	281-1961003	
*400/40	40	281-1962001	109.00
*500-50	50	281-1962002	109.00
25/10/2.5	50	281-1963003 s	87.00
30/3/1.5	60	281-1963001 s	↓
30/15/3	60	281-1963004	
50/5/2.5	50	281-1963005	
50/25/5	50	281-1963006	
100/25/2.5	50	281-1963007	
100/50/5	50	281-1963008	
150/15/1.5	75	281-1963009 s	
150/15/3	60	281-1963002	
150/30/3	60	281-1963010	
150/60/3	60	281-1963011 s	
150/75/3	75	281-1963012 s	

*Push button for low range. Sensivity 1000 ohms per volt. All voltmeters listed are self-contained.

281 D-C MILLIVOLTMETER

Range	Scale Div.	Catalog Numbers	Price
* 50	50	281-9963001	$ 80.00
*100	50	281-9963002	80.00
150	75	281-9963003	80.00
250	50	281-9963004	76.00
500	50	281-9963005	76.00
750	75	281-9963006	76.00

*Supplied with 5' leads (Model 9958) P/N 0041998.

281 D-C AMMETER

Range	Scale Div.	Catalog Numbers	Price
1	50	281-2961001	$76.00
5	50	281-2961002	↓
10	50	281-2961003	
15	75	281-2961004	
30	60	281-2961005	
*100	50	281-2964001	95.00
*150	75	281-2964002	95.00
5/2.5/0.25	50	281-2963005	86.00
10/1/0.1	50	281-2963003 s	↓
10/5/0.5	50	281-2963006	
10/2.5/1	50	281-2963007	
15/3/0.15	60	281-2963008	
15/3/1.5	60	281-2963001 s	
25/2.5/0.5	50	281-2963009	
25/5/2.5	50	281-2963010	
25/10/5	50	281-2963011	
30/3/1.5	60	281-2963004	
30/15/3	60	281-2963002	

*Provided with external shunt having a drop of 50 mv and 5' leads. For ranges higher than those listed, add price of shunt to the instrument base price $73.00.

281 D-C MILLIAMMETER

Range	Approx. Resis.	Scale Div.	Catalog Numbers	Price
1	88	50	281-4961001	76.00
1.5	45	75	281-4961002	↓
10	1.8	50	281-4961003	
50	2.0	50	281-4962004	
100	1.0	50	281-4962001	
500	0.2	50	281-4962002	
30/15/3	–	60	281-4963001	86.00
50/10/1	–	50	281-4963002	↓
125/25/5	–	50	281-4963003	
150/15/1.5	–	75	281-4963004	
600/120/30	–	60	281-4963005	

Milliammeters with ranges above 30 Milliamperes are shunted and have a drop of approximately 100 millivolts.

s — Normally Carried in Stock. Do Not Include "s" in your Order-Write up

281 D-C VOLT-AMMETER

Range		Scale Div.	Catalog Numbers	Price
Volts	Amperes			
30/3/1.5	30/3/1.5	60	281-9961004	$105.00
30/15/3	15/3/0.15	60	281-9961005	↓
30/3/1.5	30/3/0.3	60	281-9961003 s	
50/5/2.5	10/1/0.1	50	281-9961006	
50/25/2.5	25/2.5/0.5	50	281-9961007	
60/30/6	6/0.6/0.03	60	281-9961008	
60/30/3	15/3/0.3	60	281-9961015 s	
150/15/1.5	15/1.5/0.15	75	281-9961001 s	
150/15/3	15/1.5/0.15	60	281-9961009 s	
150/15/3	30/3/1.5	60	281-9961010	
150/15/3	30/15/3	60	281-9961011	
150/30/3	30/15/1.5	60	281-9961002 s	
150/30/3	30/0.6/0.06	60	281-9961012	
150/60/3	30/0.6/0.06	60	281-9961013 s	
** 30/3/.05	300/30/3	60	281-9961014	133.00
† 250/125/12.5	125/12.5/2.5 ma	50	281-9962001	125.00
† 300/150/6	15a/150/15 ma	60	281-9962002	125.00
† 600/150/15	600/150/15 ma	60	281-9962003	125.00

**The price includes an instrument, 3 shunts and one pair of leads. A leather carrying case to encase the above Model 9959 P/N 33642 s – $31.50

**A Model 9990 external Type B1 Multiplier Box can be supplied at $16.50

†Voltage Sensitivity is 1000 ohms per volt

Model 9959 – Duplastic Case P/N 0122608 s Model 281 – Price – $9.00
Model 9959 – Leather Carrying Case P/N 0025273 s – $16.25
Model 9959 – Leather Carrying Case P/N 0027619 s with shoulder strap – $20.00

440 GALVANOMETER

Approx. Microamps Per Div.	Approx. Resis. of Mov. Coil In Ohms	Approx. Ext. Critical Resis. Ohms	Approx. Period In Seconds	Catalog Numbers	Price
0.25	150	1000	2.7	440-9201001 s	$174.00
0.5	50	150	2.5	440-9201003 s	162.00
2.2	3.5	10	2.3	440-9201002 s	162.00

·Scale calibrated 30/0/30 in millimeter divisions

440 MICROAMMETER

Range	Approx. Resis. Ohms	Scale Div.	Catalog Numbers·	Price
5	100,000	50	440-5202001	$253.00
5	1,040	50	440-5202002	233.00
15	100,000	75	440-5201004	215.00
15	150	75	440-5201003	201.00
30	50	60	440-5201001	190.00
150	3.5	75	440-5201002	190.00

Model 9959 – Leather Case for Model 440 Microammeter P/N 0053069 – $26.75

s – Normally carried in stock. Do not include "s" in your order write up

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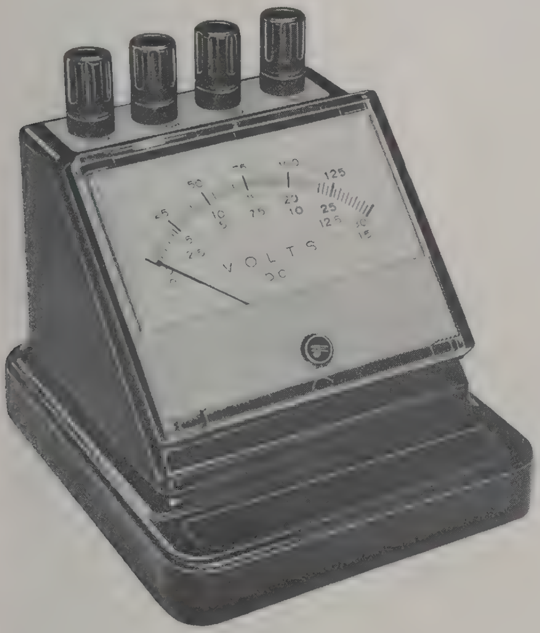
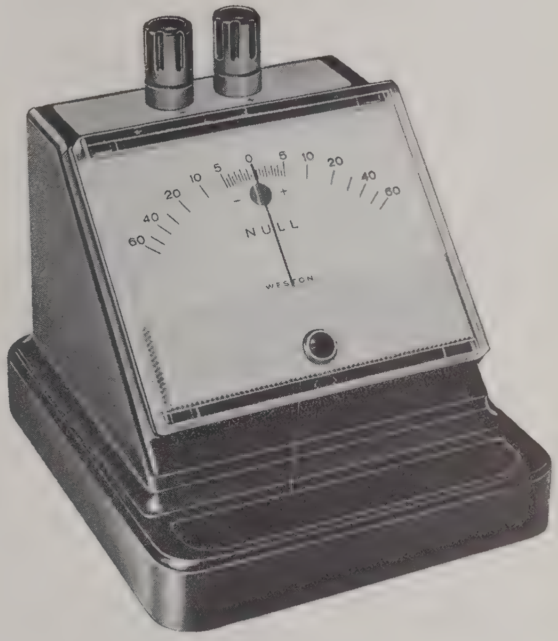
LABORATORY – PRODUCTION BENCH TESTERS

Model 2930 Series

STANDARDS
PORTABLES

06-211-D
FEB. 1968
Supersedes 06-211-C





FEATURES

- TOP QUALITY COMPONENTS FOR LONG SERVICE
- RUGGED MECHANISM – SPRING BACK JEWELS WITH LOCKING NUTS FOR FINE ADJUSTMENT
- SLOPED PANEL FOR EASE OF READING
- LARGE SCALE – READABLE AT A DISTANCE
- COLOR CODED FOR DC AND AC APPLICATIONS
- ZERO CORRECTOR PROVIDED

GENERAL

2930 Series comprises a group of AC and DC panel meters mounted in a sloped front mounting base constructed of high impact resistant plastic. These instruments are primarily designed for "bench testing" requirements both in educational and industrial laboratories. They use quality components throughout – the indicating instrument is one of the well known Weston 1900 Series of panel meters which have a proven history of accuracy and reliability.

The ranges listed are stocked by authorized Weston Distributors and special ranges can be obtained through local Weston Modification Centers. The cataloged meters are supplied with standard scales and lance type pointer, except the null indicators, which have a knife edge pointer and mirror dot at null.

A colored plastic insert is supplied on all units – yellow denotes a DC unit and red an AC unit.

MORE...

DC RANGES – MODEL 2931
(Self-shielded CORMAG®Mechanism) 2% Accuracy

Function	Range	Approx. Resistance	Scale Div.
Volts	150/15/1.5	1000Ω /v	75
↓	30/15/3	↓	60
	30/ 3/1.5		60
	15		75
Millivolts	50*	. . .	50(0-100)** 75(0-150)
Amps	30/ 3/1.5	. . .	60
↓	15	50 mv	75
	3	50 mv	60

*For use with external shunts. See circular 01-407 for available shunts. Adjusted for standard 0.065 ohm, 5 ft. leads P/N 8986; not furnished with instrument.

AC RANGES – MODEL 2932
(Rectifier Type – Shielded Mechanism) 2% Accuracy

Function	Range	Approx. Resistance	Scale Div.
Volts	300/150/30	1000Ω /v	60
"	150/ 15/3	"	75

AC RANGES – MODEL 2934
(Iron Vane Type Mechanism) 2% Accuracy

Function	Range	Approx. Resistance	Scale Div.
Amps	30	.00056 Ω	60
↓	5	.016 Ω	50(0-100)** 75(0-150)

**Double scale for use with external accessories (eliminates interpolation problems).

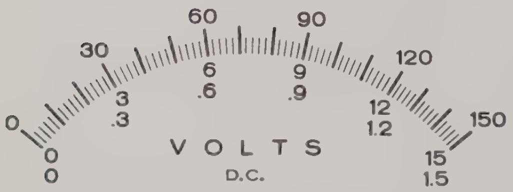
NULL INDICATORS

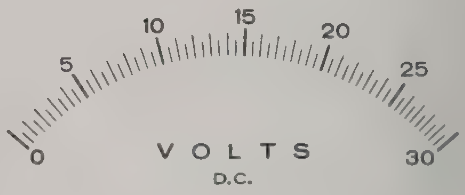
Model	Scale	ua/ mm and Division	Resistance of Moving Coil	End Scale Sensitivity	External Critical Damping Resistance
2931	30-0-30	2.5 ua/ mm 2 ua/ div	1350 Ω ± 20%	60-0-60 ua ± 20%	50,000 Ω
2936	30-0-30	1.25 ua/ mm 1 ua/ div	1870 Ω ± 20%	30-0-30 ua ± 20%	50,000 Ω
2936	60-0-60*	0.4 ua/ mm 0.5 ua/ div	2300 Ω ± 20%	†	35,000 Ω

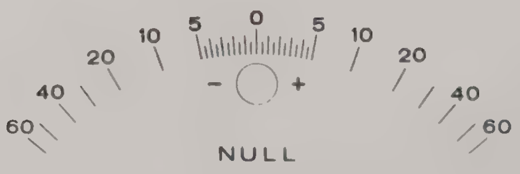
† This unit has a special characterized mechanism (approx. Sq. Law)
Current values are: 10 ua (±10%) at ±20° deflection points.
60 ua (±20%) at ±50° deflection points.

* See Null Scale below.

TYPICAL SCALES
(FULL SIZE)

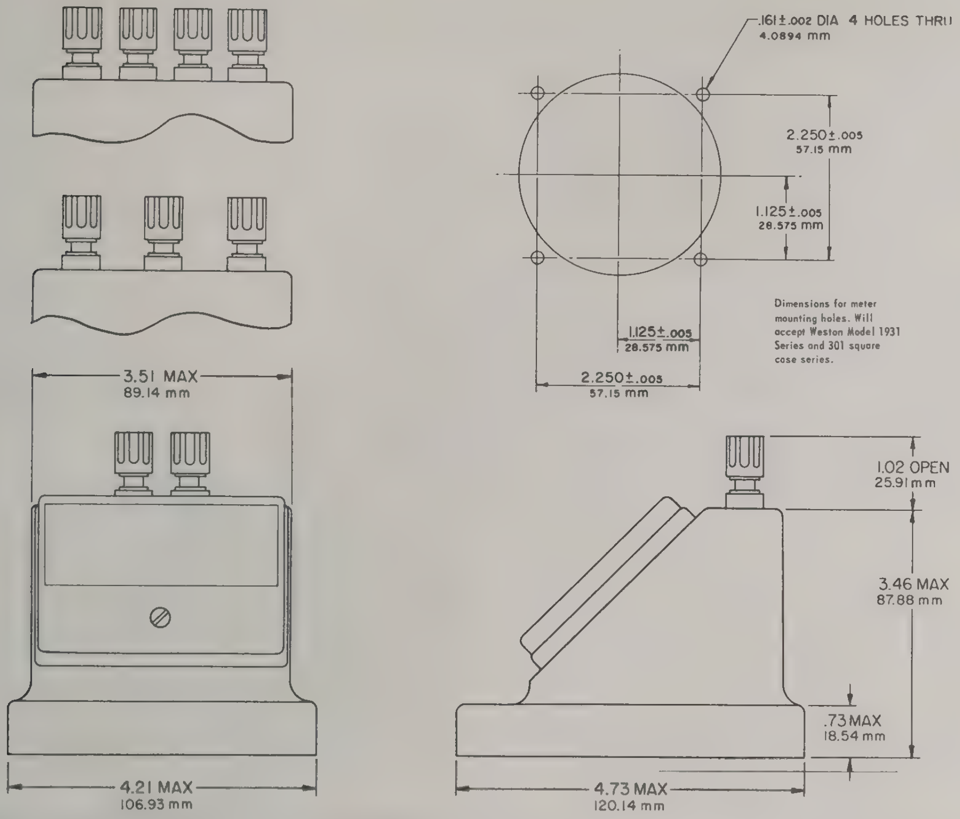






DIMENSIONAL DRAWINGS

(all dimensions are approximate)

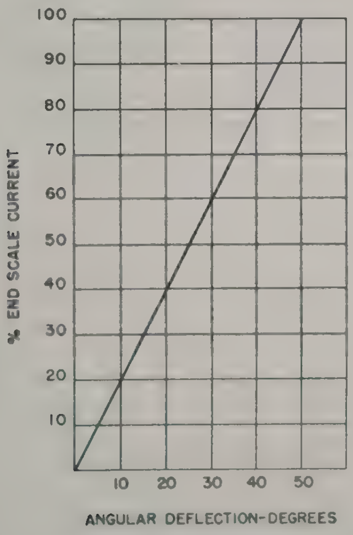

.161±.002 DIA 4 HOLES THRU
4.0894 mm
2.250±.005
57.15 mm
1.125±.005
28.575 mm
Dimensions for meter mounting holes. Will accept Weston Model 1931 Series and 301 square case series.
1.125±.005
28.575 mm
2.250±.005
57.15 mm
3.51 MAX
89.14 mm
1.02 OPEN
25.91 mm
3.46 MAX
87.88 mm
.73 MAX
18.54 mm
4.21 MAX
106.93 mm
4.73 MAX
120.14 mm

TWO TERMINAL ASSEMLED BASE – MODEL 9986

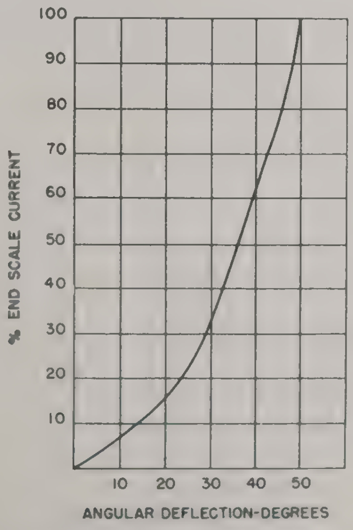
Includes base, terminals, internal leads* from terminals to meter (meter not supplied). . . . . . Part No. 187269-901

*Internal leads are for use with instruments having #8 BC studs only.

DEFLECTION CURVES



LINEAR MECHANISM



CHARACTERIZED MECHANISM

MOUNTING BASE PARTS

BASE ONLY – MODEL 9999

No. of Terminal Holes*	Part No.
2	187233-901
3	187234-901
4	187235-901

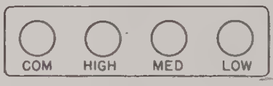
*Terminal cut outs are keyed for binding posts, listed at right.

5 WAY BINDING POSTS MODEL 9999

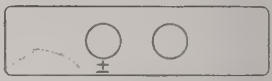
Color	Part No.
Red	ND 37919-901
Black	ND 37919-902

TERMINAL IDENTIFICATION FOILS MODEL 9999

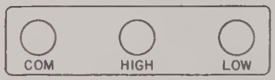
Terminals	Part No.
Two	187255- 901
Three	187256- 901
Four	187257- 901
Two	187258- 901



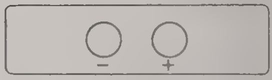
187257-901



187258-901



187256-901

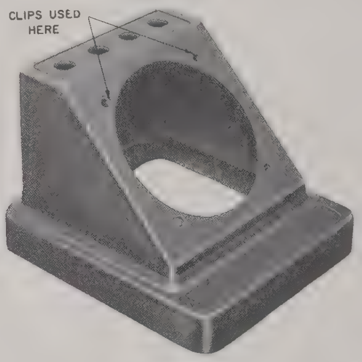


187255-901

MOUNTING CLIPS MODEL 9999
(Two required per base).

Part No. ND 38664

Minimum Package of 20.



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WESTON INSTRUMENTS, INC.
614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
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WESTON®

LABORATORY AND PRODUCTION
BENCH TESTERS
MODEL 2930 SERIES

PRICE LIST
06-211

Effective
JAN. 1, 1970

SUPERSEDES ISSUE
DATED 12/1/68

All Prices Subject to Change Without Notice and are F. O. B. Factory, Newark, N. J.

MODEL 2931 DC RANGES

Range	Sensitivity	Catalog No.	Price
150 15 1.5 Volts	1000 Ω/V	2931-1722054 s	$45.00
30/15/3 "	"	2931-1722053 s	45.00
30/ 3/1.5 "	"	2931-1722052 s	45.00
15 "	"	2931-1722051 s	31.00
50 Millivolts		2931-9722058 s	31.00
30/ 3/1.5 Amps		2931-2721057 s	67.00
15 "	50 mv	2931-2721056 s	31.00
3 "	50 mv	2931-2721055 s	31.00

NULL INDICATOR

Scale	ua/Division	Catalog No.	Price
30-0-30	2 ua/div.	2931-4721059 s	$31.00
30-0-30	1 ua/div.	2936-4721060 s	43.00
See Cir.	0.5 ua/div.	2936-4721061	48.00

MODEL 2932 AC RANGES

Range	Sensitivity	Catalog No.	Price
300/150/30 Volts	1000 Ω/V	2932-1722063 s	$51.00
150/ 15/3 "	"	2932-1722062 s	51.00

MODEL 9986 – TWO TERMINAL ASSEMBLED BASE

For use with instruments with No. 8 B.C. Studs only.

Includes base, terminals, internal leads from terminals to meter (meter not supplied)

Direct Current

Part No. 187269-901	$ 7.25

Alternating Current

Part No. 187272-901	$ 7.25

MODEL 2934 AC RANGES

Range	Sensitivity	Catalog No.	Price
30 Amps	.00056 Ω	2934-2722065 s	$33.00
5 "	.016 Ω	2934.2722064 s	33.00

MOUNTING BASE PARTS

Consult Parts Pricing Book and use applicable discounts per parts schedule.

s -- Normally carried in stock. Do not include "s" in order write-up.

WESTON INSTRUMENTS DIVISION
WESTON INSTRUMENTS, INC.
614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
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Printed in U.S.A.

06-300-E
December 3, 1967
Supersedes 06-300-D

WESTON
A-C POCKET SIZE CLAMP VOLT-AMMETER

Accurate within ±3% of full scale value when used on 50-60 cycles.

±5% of full scale value when used on 400 cycles.

Scale Length 2.36″

Size 7½″ x 3″ x 1¼″ **Approx. Wt. 14 oz.**

An easy to handle, lightweight clamp volt-ammeter designed particularly for the electrician, service man, engineer and motor repair shop. Contains six current ranges and three voltage ranges quickly readable from any angle on one large size scale.

Supplied complete with carrying case, voltage test leads with insulated battery clips and three accessory probes.

FEATURES

- Light Weight, Compact, Hand-Fitting Design
- Easily Slipped into Pocket
- Precision Ground Faces Provide Positive Jaw Contact
- Accommodates Conductors up to 1″ Round or 1¾″ x ⅜″ Rectangular
- Large, Smooth Action Trigger
- Satin Finish Black Bakelite Case
- Positive Action Range Selector Switch
- Shatterproof Wrap-around Plastic Window
- Only One Scale for all Ranges
- Bright Red Pointer for Easy Reading
- Uses New Shock-Mounted Core Magnet Mechanism
- Spring-Back Jewels for Rugged Service
- Fully Insulated for 750 Volt Service
- Sturdy Carrying Case with Convenient Lead Compartment

Ranges

300/150/60/30/15/6 amperes a-c; 600/300/150 volts a-c

Plug-In Adapter — Model 9886

This adapter is extremely useful where voltage and current measurements must be made on appliances and other equipment having a power cord. Simply insert the appliance cord into the the "direct" or "divide by 10" side of the adapter. Plug the adapter into a wall outlet. Clamp the jaws of the Model 749 through the adapter hole and read current. Line voltage is available at the unused receptacle on the side of the adapter by inserting the test lead probes and moving the function switch to "volts".

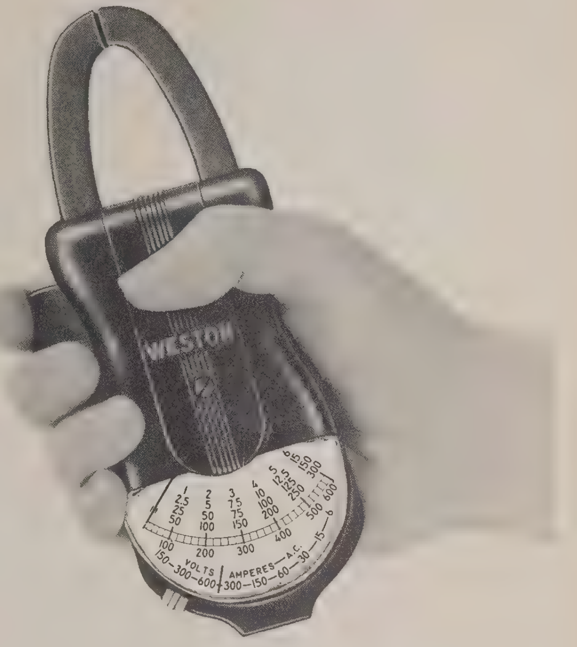
The adapter is rated for 250 volts A.C. Up to 25 amperes can be applied to the "direct" receptacle and up to 10 amperes to the "divide by 10" connection.

The adapter is not included with the Model 749 and must be purchased separately.

Model 749*	Cat. No. 749-2901001 S.................	$57.75
Model 749	Carrying Case P/N 150918-001 S	4.00

*Includes test leads, carrying case, probes.

Prices subject to change without notice.


WESTON
1 2.5 25 50
2 5 50 100
3 7.5 75 150
4 10 100 200
5 12.5 125 250
6 15 150 300
100 200 300 400 500 600
VOLTS
AMPERES—A.C.
150—300—600
300—150—60—30—15—6

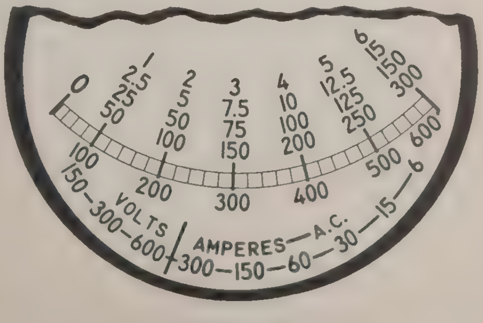
Model 749 Clamp Volt-Ammeter
Shown Approximately ½ Size

ADAPTER
WESTON

Model 9886 Plug-In Adapter

P/N 159983S................ $7.00

Clamp Volt-Ammeter, Divided Carrying Case, Voltage Test Leads And Three Probes


0
1 2.5 25 50
2 5 50 100
3 7.5 75 150
4 10 100 200
5 12.5 125 250
6 15 150 300
100
200
300
400
500
600
VOLTS
150—300—600
AMPERES—A.C.
300—150—60—30—15—6

Model 749 Actual Size Scale

Pat. Nos. D-177,674; 2,842,739; 2,846,658; 2,848,567

(OVER)

A-C CLAMP AMMETER AND VOLT-AMMETER

Accurate within ±3% of full scale value when used on 50-70 cycles*

Scale Length 2.36″

Size 13⅝″ x 4⅜″ x 2½″ **Approx. Wt. 3¾ lbs.**

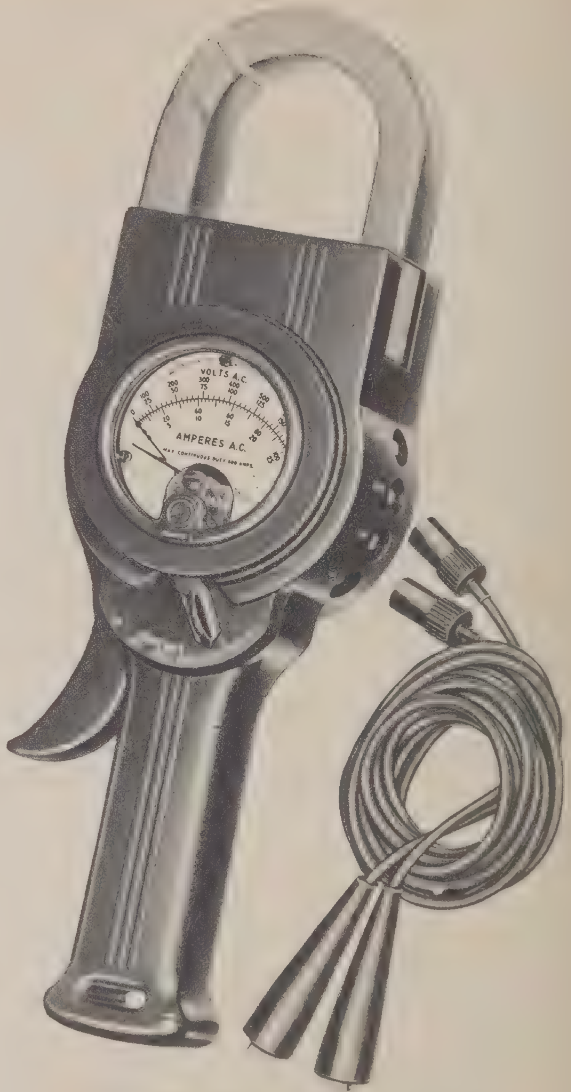
The ideal maintenance tool for on-the-job testing. Rapidly measures a-c voltage and current without breaking the circuit. Combines in one instrument three a-c voltage ranges and five a-c current ranges, completely covering voltages and currents most frequently encountered in industrial and utility service.

Clamp Ammeter is similar to the Clamp Volt-Ammeter except that it is not provided with the voltage features or regularly equipped with an adjustable pointer stop.

*Can be adjusted for same accuracy at 400 cycles.

FEATURES

- Dependable Magnetic Circuit
- Rugged Bakelite Case
- Non-Shatterable Glass
- Easily Read, Double Scale
- Pear-shaped Pointer for Maximum Visibility
- Adjustable Pointer Stop for Measuring Motor-Starting Currents
- Successive Voltage and Current Readings at the Flick of a Switch
- Positive, Convenient 6-Position Range and Selector Switch
- Safety Type Trigger—Designed for Glove or Bare Hand Use
- Slot for Carrying Strap
- Solid Bakelite Handle—Man-Size Grip
- 5 A-C Current Ranges—(1000/250/100/25/10 amperes full scale)
- Flexible Potential Leads Supplied
- 3 A-C Voltage Ranges—(700/350/175 volts full scale)
- Fast, well damped movement
- Complete Instrument Insulated for 750 Volt Service
- Clamping Jaw Insulation—Long Service, Replaceable Rubber
- Can be Hung on a Conductor, Leaving Operator's Hands Free
- Conductors up to 2″ in Diameter



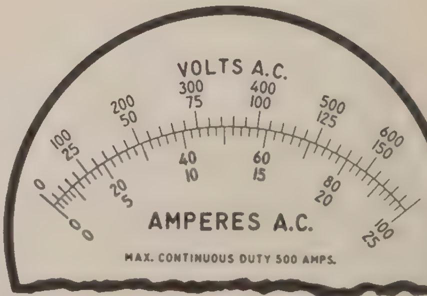
Model 633—Clamp Volt-Ammeter, Type VA-1

Ranges

Model 633 Type VA-1 (Includes Potential Leads) 1000/250/100/25/10 amperes a-c – 700/350/175 volts a-c Cat. No. 633-9901001 S	$167.00
Model 633 Type A-1 – 500/250/100/50/25/10 amperes a-c – Cat. No. 633-2901001 S	$158.00
Model 633 Type A-2 – 1000/500/250/100/25/10 amperes a-c – Cat. No. 633-2901002 S	$158.00
Model 633 Type A-3 – 2000/1000/500/250/100/50 amps a-c – Cat. No. 633-2901003 S	$158.00

Accessories

Model 9958, 50 Foot Extension Cable, Plug and Receptacle for Model 633 Types A-1 – 9958-9901001 S, A-2 – 9901002 S, A-3 – 9958-9901003 S	$93.25
Leather Carrying Case Model 9959 – (For above Cable, Plug and Receptacle) – Cat. No. 9959-94167 S	$26.50
Leather Carrying Case (Model 633 Types VA-1, A-1, A-2, A-3) – Cat. No. 9959-90856 S	$16.00



Actual Size Scale
Model 633

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COM
mA
ZERO
200 mV μA
2
V mA
20
200
1000
500 VAC
OFF
DC
200
2K
20K
Ω
200K
2M
20M
AC
V-Ω
mA
mA
V

Digital Panel Meters/Digital Multimeters/Battery Packs

TABLE OF CONTENTS

Introduction 2
Specification Selection Guide 3
Digital Panel Meters 4–15
  Model 1260 4,5
  Model 1261 6,7
  Model 1266 8,9
  Model 1280 10,11
  Model 1290 12,13
  Model 1292 14,15
Digital Multimeters 18–21
  Model 1240 18–21
  Model 1241 20
Digital Panel Meter Dimensions 16,17
Typical Mounting Arrangements 16
Battery Pack 22,23

THEORY OF OPERATION

DUAL-SLOPE INTEGRATION PROVIDES TRUE READINGS WITHOUT INTERFERENCE

A significant feature of the Weston Digital Instrument Line* is the principle whereby analog signals are converted to digital form. The choice of a dual-slope integration technique, with sensing intervals related to power frequency, provides true average output readings and avoids series mode interference problems. Since this conversion approach is independent of both the value of the integrating capacitor and the clock frequency, freedom from drift is also assured.

Highest accuracy and stability have been achieved without resorting to the usual costly resistive ladders. The input voltage charges an integrating capacitor to a finite level. This value is compared with a reference source which discharges the capacitor to zero volts. The time required for discharge is measured and counted, and the stored counts are then delivered to the readout circuits. Accuracy is maintained by a controlled ratio between two stable resistors and a zener.

---

*U. S. Pat. #3,051,939 and patents pending.

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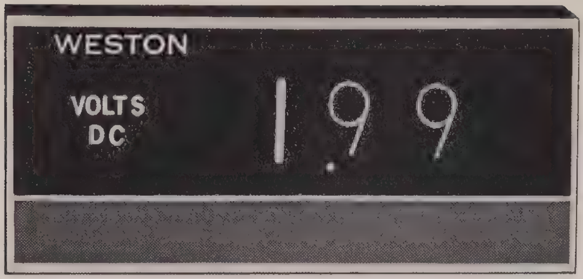
SPECIFICATION SELECTION GUIDE

SPECIFICATIONS	**DIGITAL PANEL METERS**				
	MODEL 1260	**MODEL 1261**	**MODEL 1280**	**MODEL 1290**	**MODEL 1292**
Ranges (Voltages) and Input Impedance	0–199 MV @ 20 K 0–1.99 V @ 200 K 0–19.9 V @ 2 Meg 0–199 V @ 2 Meg 0–1000 V @ 2 Meg	0–100 MV @ 50 Meg 0–1.00 V @ 500 Meg 0–10.00 V @ 5 Meg 0–100 V @ 5 Meg 0–1000 V @ 5 Meg	0–100 MV @ 10 K 0–1.00 V @ 100 K 0–10.00 V @ 1 Meg 0–100 V @ 1 Meg 0–1000 V @ 1 Meg	0–100 MV @ 10 K 0–1.00 V @ 100 K 0–10.00 V @ 1 Meg 0–100 V @ 1 Meg 0–1000 V 1@ Meg	0–100 MV @ 100 Meg 0–1.00 V @ 1000 Meg 0–10.00 V @ 10 Meg 0–100 V @ 10 Meg 0–1000 V @ 10 Meg
Ranges (Current)	0–19.9 ua @ 200 MV 0–199 ua @ 200 MV 0–1.99 MA @ 200 MV 0–19.9 MA @ 200 MV 0–199 MA @ 200 MV	0–10 ua @ 100 MV 0–100 ua @ 100 MV 0–1 MA @ 100 MV 0–10 MA @ 100 MV 0–100 MA @ 100 MV	0–10 ua @ 100 MV 0–100 ua @ 100 MV 0–1 MA @ 100 MV 0–10 MA @ 100 MV 0–100 MA @ 100 MV	0–10 ua @ 100 MV 0–100 ua @ 100 MV 0–1 MA @ 100 MV 0–10 MA @ 100 MV 0–100 MA @ 100 MV	0–1 ua @ 100 MV 0–10 ua @ 100 MV 0–100 ua @ 100 MV 0–1 MA @ 100 MV 0–10 MA @ 100 MV 0–100 MA @ 100 MV
Accuracy	± 0.5% F.S. ±1 Digit 25°C±10°C	±0.1% F.S. ±1 Digit 25°C±10°C	±0.05% F.S. ±1 Digit	±0.1% F.S. ±1 Digit 25°C±10°C	±0.1% F.S. ±1 Digit 25°C±10°C
BCD Output	Optional	Optional	Standard	Standard	Standard
Overrange	25% (Except 1000 V)	50% (Except 1000 V)	20% (Except 1000 V)	100% (Except 1000 V)	100% (Except 1000 V)
Readings/Second	10/second (Std.)	5/second (Std.)	1/second (Std.)	6/second (Std.)	5/second (Std.)
Common Mode Rejection (CMRR)	80 dB @ 60 Hz	Greater than 60 dB @ 60 Hz	80 dB @ 70 Hz	80 dB @ 60 Hz	80 dB @ 60 Hz
Normal Mode Rejection (NMRR)	35 dB @ 60 Hz	Greater than 30 dB @ 60 Hz	35 dB @ 60 Hz	35 dB @ 60 Hz	35 dB @ 60 Hz
Power Requirements (220 Volt Units Available on Special Order)	117 V±10% 50–400 Hz 5 watts	117 V±10% 50–400 Hz 6 watts	117 V±10% 50, 60 or 400 Hz 18 watts	117 V±10% 60–400 Hz 50 Hz (optional) 5 watts	117 V ± 10% 60–400 Hz 50 Hz (optional) 7 watts
Response Time To Full Scale Input	Less than 1 second	Less than 1 second	Less than 2 seconds	Less than 1 second	Less than 2 seconds
Approximate Weight	1 lb.	1 lb.	3 lbs.	1 ¼ lbs.	1 ¼ lbs.

Model 1266 Event Counter See Page 8.
Model 1240 Portable Digital AC/DC Multimeter See Page 18.
Model 1241 Portable Digital Volt/Ohmmeter See Page 20.



MODEL 1260 ECONOMY DPM

Weston has developed an economy Digital Panel Meter which is priced in an area truly compatible with analog instruments. The new Model 1260 is a 2½ digit unit priced below $100. in quantities of 25. To achieve a design with a selling price below $100. requires an approach having the simplicity of dual slope integration (Weston patents 3,051,939 and 3,316,547) but with considerably fewer components. To satisfy these requirements Weston engineering developed a novel voltage-to-time converter capable of being packaged with its complete power supply and readout on a single side of a printed circuit board, having approximate dimensions of 4"×3". This new circuit achieves the cost objectives without sacrificing high normal and common mode rejection with a non-blinking readout.

The Model 1260 fits into 7 square inches of panel and mounts completely from the front of the panel. The entire chassis pulls out from the front, for servicing operation. Standard features include ±.5% F.S. ±1 digit accuracy and a circularly polarizing window filter. Special features such as BCD output, remote hold and special captions can be supplied on order.

MODEL 1260 FEATURES

1. 25% over-range is standard.
2. Takes only 7 sq. inches of panel space—less than any other DPM on the market.
3. Complete 1260 can be mounted entirely from front of panel.
4. Complete chassis removal from front of panel—can be exchanged with new chassis in less than 30 seconds.
5. Sampling rates tied to phased locked fundamentals of 60 Hz for excellent noise rejection characteristics.
6. Circularly polarizing viewing window.
7. Top rated components including Burroughs Nixies®.
8. Circuit boards "Repairable"—not potted.

® Reg. Trademark Burroughs Corp.

SPECIFICATIONS	MODEL 1260
Ranges: **Volts**	**Input Resistance**
0–199 millivolts	20 K ohms
0–1.99 volts	200 K ohms
0–19.9 volts	2 megohms
0–199 volts	2 megohms
0–1 kilovolts	2 megohms
Current:	
0–19.9 microamps	10 K ohms
0–199 microamps	1 K ohm
0–1.99 milliamps	100 ohms
0–19.9 milliamps	10 ohms
0–199 milliamps	1 ohm
Accuracy:	±.5% full scale ±1 digit. 25°C±10°C
Out of Range Indicator:	Indicates when unit is below or above standard range
Extreme Temperature Operating Range:	5°C to 45°C
Storage Temperature:	—40°C to +70°C
Common Mode Rejection:	80 DB with 1000 ohm unbalance at 60 Hz
Normal Mode Rejection:	35 DB at 60 Hz
Readings Per Second:	10
Response Time:	<1 second
Power Requirements:	117 volts ±10%, 50 to 400 Hz –5 watts
Weight:	Less than 1 lb. (430 grams)

See Page 16 For Mounting Dimensions.

Model 1260 chassis (slid) partially out of case.

Rear view of Model 1260 showing connector removed (supplied as an accessory).

WESTON
MILLIVOLTS D.C.
99.9

MODEL 1261 DIGITAL PANEL METER

The Model 1261, Weston's latest addition to its miniaturized line of digital panel meters, was specifically developed to meet the needs of the OEM market. It is designed for volume production at the lowest possible cost without compromising the superior preformance associated with Weston products.

The Model 1261 is a single polarity DPM with a full scale readout of 999 with a 50% over-range capability. It includes Weston patented dual slope circuitry (Patent No. 3051939), and has an accuracy of 0.1% full scale ±1 digit with a minimum full scale range of 100 millivolts (99.9 MV) or 10 microamps (9.99 ua). Input impedance is high (50 megohms on 100 millivolt range) making it suitable for the most sensitive applications.

The complete instrument is packaged in Weston's standard miniaturized DPM housing which takes only 7 square inches of panel space (4" × 1.75") with a depth behind panel of less than 4.5". This instrument far exceeds requirements of ASA C 39.1 for analog type panel meters and has been designed to operate in environments common to industrial application.

Since this is basically a digital panel meter intended to be built into the OEM's product, variations from the listed specifications are possible which will allow this unit to be tailored to your needs. These include such things as faster sampling rates, circuit adjustments allowing direct readout in engineering units thus eliminating any multiplying factors, suppressed ranges for operating from industrial transmitters, BCD output when required, and over-range capabilities.

The Model 1261 is backed by Weston's standard warranty clause.

MODEL 1261 FEATURES

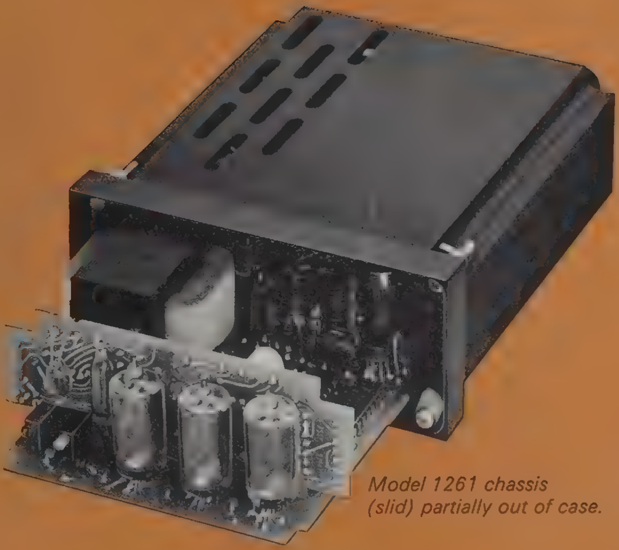
1. Takes only 7 square inches of panel space.
2. Complete 1261 can be mounted entirely from front of panel.
3. Complete chassis removal from front of panel–can be exchanged with new chassis in less than 30 seconds.
4. High input impedance.
5. Dual slope integration for long term stability.
6. Circuit boards "Repairable"–not potted.
7. Top rated components including Burroughs Nixie® tubes.
8. 50% over-range standard.
9. BCD available on order.

® Registered trademark Burroughs Corp.

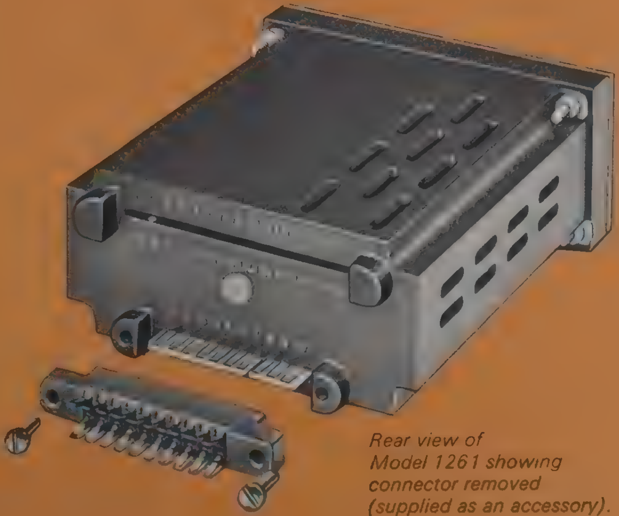
MODEL 1261

SPECIFICATIONS	MODEL 1261
Ranges: **Volts**	**Input Impedance**
0–100 millivolts	50 megohms
0–1 volt	500 megohms
0–10 volts	5 megohms
0–100 volts	5 megohms
0–1000 volts	5 megohms
Current:	
0–10 microamps	10 K ohms
0–100 microamps	1 K ohm
0–1 milliamp	100 ohms
0–10 milliamps	10 ohms
0–100 milliamps	1 ohm
Accuracy:	±0.1% full scale ±1 digit 25°C±10°C
Out of Range Indicator:	Blinking "1" for over-range Separate light for under-range
Over-Range:	50% (reads to 1,500)
Extreme Temperature Operating Range:	5°C to 45°C
Storage Temperature:	—40°C to 70°C
Stability:	8 hours 0.1% or less after ½ hour
Response Time:	<1 second
Readings Per Second:	5
Common Mode Rejection:	>60 DB with 1000 ohms input unbalance at 60 Hz
Normal Mode Rejection:	>30 DB at 60 Hz
Power Requirements:	117 volts±10%, 50 to 400 Hz –6 watts
Weight:	Approximately 1 lb. (430 grams)

See Page 16 For Mounting Dimensions.



Model 1261 chassis (slid) partially out of case.



Rear view of Model 1261 showing connector removed (supplied as an accessory).

MODEL 1266 EVENT COUNTER

The latest edition to the Weston line of digital panel meters is a miniaturized electronic event counter. The new Model 1266 utilizes up-to-date medium scale integrated circuits mounted on a single printed circuit board. This event counter is offered in three ranges, 0 to 99, 0 to 199, and 0 to 999.

The pulse input denoting an "event" must be a positive going pulse having a low value between —2.0 V and +0.45 V with the high amplitude value between +1.2 V and +4.0 V. Pulse width is 250 nano seconds minimum with a positive going slope of 1 V/microsecond minimum. These pulses are supplied from the customer's circuit which is usually a transistor switching circuit. Application assistance is available when needed.

The Model 1266 mounts completely from the front of the panel, and occupies only seven square inches of panel space. The chassis pulls out from the front for servicing. Readability and appearance is enhanced through the use of circularly polarizing window filters.

MODEL 1266 FEATURES

1. Takes only seven square inches of panel space.
2. Appearance matches Weston's digital panel meters.
3. Model 1266 can be mounted entirely from the front of the panel.
4. Complete chassis removable from the front of the panel.
5. Circularly polarizing viewing window.
6. Top rated components including Burroughs Nixies.®

® Reg. Trademark Burroughs Corp.

MODEL 1266

SPECIFICATIONS	MODEL 1266
Ranges: 99 199 999	
Input: Positive going pulse High: Amplitude 1.2 to 4.0 V Width 250 nano seconds minimum Slope 1 V/microsecond minimum Low: Amplitude +0.45 to —2.0 V	
Reset: Contact closure to +3.6 V (supplied from the Model 1266) or positive voltage input 1.2 to 4.0 V at terminal 4.	
Frequency:	1 mHz maximum
Count Input Impedance:	2 K ohms in series with transistor base–emitter diode
Reset Input Impedance:	300 ohms (as above)
Storage Temperature:	—40°C to +70°C
Extreme Temperature Operating Range:	5°C to 50°C
Power Requirements:	117 volts ±10% standard 50 to 400 Hz 220 V AC, on special order. Typically less than 5 watts
Weight:	Less than 1 lb. (430 grams)

See Page 17 For Mounting Dimensions.

Model 1266

Rear view of Model 1266 showing connector removed (supplied as an accessory).

WESTON
33.88
MILLIVOLTS D.C.

MODEL 1280 (FOUR 9'S)
(NON-BLINKING DISPLAY)

The Weston Model 1280, four digit DPM is available in a choice of ten voltage and current ranges. It is equipped with special magnetic nameplates which, when removed, permit easy access to all calibration adjustments. Color coding is offered if desired. Nixie® tubes are easily replaced from the front of the panel. The dual, decimal-number, tube is interchangeable with other tubes.

OPERATION

A cycle of measurement is initiated by the 1 Hz clock (see Figure 1), resetting the display flip-flop (FF303) which in turn enables the "and" gate (G301), permitting pulses to flow into the units decade counter. The combination of the four decade counters and the ÷8 count up to 78,000 where a pulse is delivered to the control flip-flop. The control flip-flop enables the analog gate forcing the amplifier to integrate back to zero. The zero crossing of the output of the amplifier causes the control flip-flop to trigger, disabling the analog gate and feeding the first of four pulses to the ÷4 counter. The integrating capacitor now charges at a rate determined by the input signal plus an offset bias equal to 2000 counts. The offset bias is deliberately used to eliminate possible indeterminacy around zero and improve series mode rejection. Compensation for the 2000 offset is provided by the start of the capacitor discharge commencing at 78,000 in the counters rather than 80,000; a "2000 pulses" discharge reading is equal to a zero signal input and a "12,000 pulses" discharge reaching to full scale input.

When an interval of 80,000 pulses has again occurred (78,000 in counters) the control flip-flop will again be reset, enabling the analog gate a second time and forcing the integrator back to zero a second time. The zero crossing of the output of the amplifier causes the control flip-flop to trigger a second time, disabling the analog gate and feeding the second of four pulses to the ÷4 counter. This sequence of events continues for the third and fourth samples (see Figure 2). On the last sample however, the fourth pulse to the ÷4 counter triggers the display flip-flop and disables the "and" gate. The information that is now in the counter decades is transferred to the storage register for readout by the four display tubes.

The unit will remain in this static mode until the next pulse from the 1 Hz clock initiates a cycle.

FOR PRINTER OPERATION

Print Command: As conversion is completed a 1.5 volt pulse is produced which can be used as a command to print.

Remote Command: Achieved by external contact closure or application of a 5 volt pulse. Readings may be held as desired. The same approach may be used to synchronize a number of units.

BCD: 1-2-4-8 (4 decades) terminal connections on rear of unit.

Logic: BCD output compatible with industrial RTL (resistor, transistor, logic) micrologic or equivalent.

Logic Levels: "1" ≦0.4 volt–"0" ≧1.0 volt.

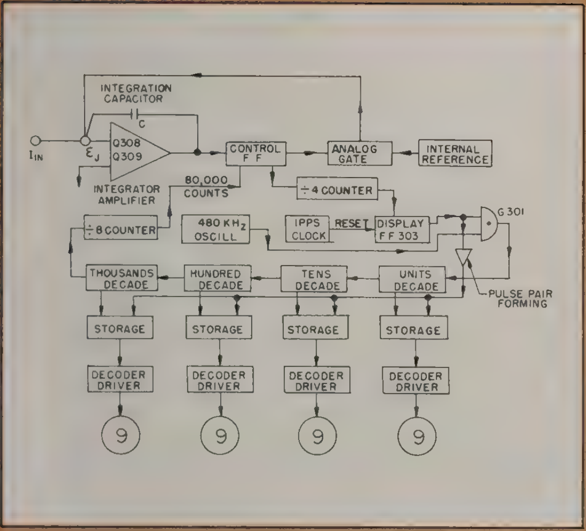
OVERLOAD PROTECTION:

Continuous voltage without damage is as follows:

Range	Max. Voltage
100 millivolts	100 volts
1 volt	200 volts
10 volts	1000 volts
100 volts	1000 volts
1000 volts	1100 volts

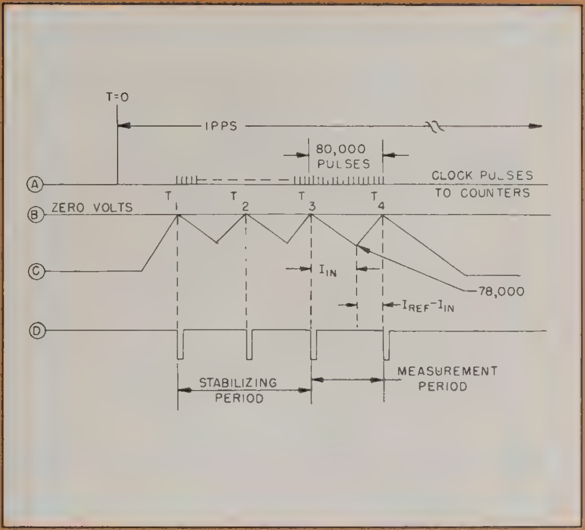
® Reg. Trademark Burroughs Corp.

MODEL 1280



INTEGRATION CAPACITOR
C
I_{IN}
$\mathcal{E}_J$
Q308
Q309
INTEGRATOR AMPLIFIER
CONTROL F F
ANALOG GATE
INTERNAL REFERENCE
80,000 COUNTS
÷4 COUNTER
÷8 COUNTER
480 KHz OSCILL
IPPS CLOCK
RESET
DISPLAY F F 303
G 301
PULSE PAIR FORMING
THOUSANDS DECADE
HUNDRED DECADE
TENS DECADE
UNITS DECADE
STORAGE
STORAGE
STORAGE
STORAGE
DECODER DRIVER
DECODER DRIVER
DECODER DRIVER
DECODER DRIVER
9
9
9
9

Figure 1. Model 1280. Block Diagram.

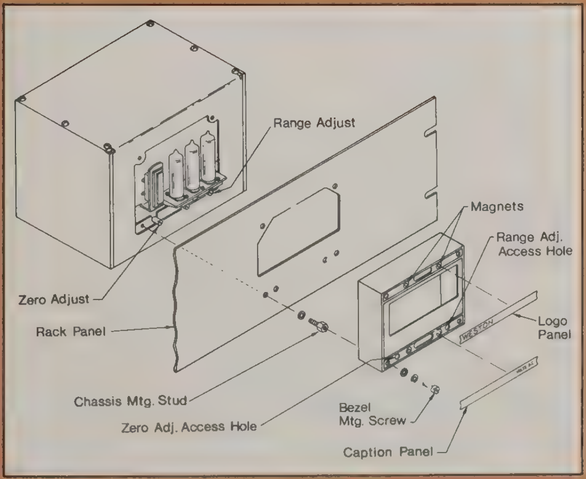


T=0
IPPS
80,000 PULSES
CLOCK PULSES TO COUNTERS
A
B
C
D
ZERO VOLTS
T 1
T 2
T 3
T 4
I_{IN}
78,000
$I_{REF}-I_{IN}$
STABILIZING PERIOD
MEASUREMENT PERIOD

Figure 2. Model 1280. Readout Cycle.

SPECIFICATIONS	**MODEL 1280 4 DIGIT (FOUR 9'S)**
Ranges: **Volts**	**Input Impedance**
0–100 millivolts	10 K ohms
0–1 volt	100 K ohms
0–10 volts	1 megohm
0–100 volts	1 megohm
0–1000 volts	1 megohm
Current:	
0–10 microamps	100 millivolts
0–100 microamps	100 millivolts
0–1 milliamp	100 millivolts
0–10 milliamps	100 millivolts
0–100 milliamps	100 millivolts
Accuracy:	±0.05% F.S. ±1 digit 117 V ±10%
Readings Per Second:	1/second (Std.)
Common Mode Rejection:	80 DB at 60 Hz
Normal Mode Rejection:	35 DB at 60 Hz
Power Requirements:	117 volts ±10% 50, 60 or 400 Hz
Response Time:	<2 seconds
Weight:	Approximately 3 lbs.

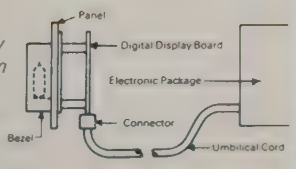
See Page 17 For Mounting Dimensions.



Range Adjust
Magnets
Range Adj. Access Hole
Zero Adjust
Rack Panel
Logo Panel
WESTON
Chassis Mtg. Stud
Zero Adj. Access Hole
Bezel Mtg. Screw
Caption Panel

Mounting Arrangement For 1280

The Weston Digital Panel Meter may be conveniently located up to four feet from the Nixie® tube display. This configuration requires only a maximum of 2½" behind the panel.



Panel
Digital Display Board
Electronic Package
Connector
Umbilical Cord
Bezel

WESTON
MILLIVOLTS D.C.
199.9

MODEL 1290 OVER-RANGE WITH STORAGE DISPLAY

We built our second generation DPM * to fit into seven square inches of panel. That's less than any other digital panel meter requires. But we didn't stop there. The Model 1290 mounts completely from the front of the panel. The entire chassis pulls out from the front for servicing or replacement. Even the Nixie® tubes are pluggable! Think of the convenience in continuous systems operation. Despite the smaller package, Model 1290 has all the features our original DPM is so widely acclaimed for–3-digit plus 100% overrange display, 0.1% ±1 digit accuracy, circularly polarizing window filter, dual slope integration, storage display and BCD output. Many of these standard Weston features are still "optional at extra cost" on competitive units. Our new compact is styled for tomorrow, available today, and priced below $200 in quantity.

MODEL 1290 FEATURES

1. 100% over-range is standard.
2. Full storage display is standard.
3. Takes only 7 square inches of panel space– less than any other DPM on the market.
4. Complete 1290 can be mounted entirely from front of panel.
5. Complete chassis removal from front of panel– can be exchanged with new chassis in less than 30 seconds.
6. 1-2-4-8 BCD positive output logic is standard.

   0 = <0.4 V
   1 = >1.0 V
7. Sampling rates tied to phased locked fundamentals of 60 Hz for excellent noise rejection characteristics.
8. Circular polarizing viewing window.
9. Top rated components including Burroughs Nixie® tubes.
10. "Plug-in" Nixies–no soldering to replace.
11. Circuit boards "Repairable"–not potted.

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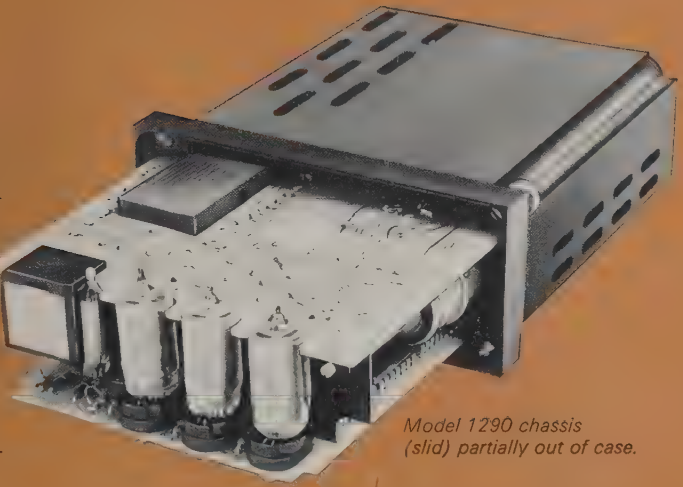
* Reg. Trademark

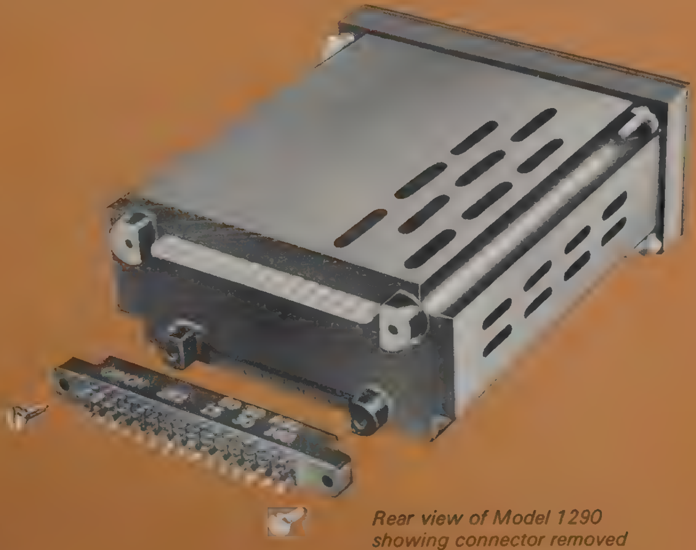
® Registered trademark Burroughs Corp.

MODEL 1290


Model 1290 chassis (slid) partially out of case.

SPECIFICATIONS	MODEL 1290
Ranges:	
Voltages	**Input Impedance**
0–100 millivolts	10 K ohms
0–1 volt	100 K ohms
0–10 volts	1 megohm
0–100 volts	1 megohm
0–1000 volts	1 megohm
Current:	
0–10 microamps	100 millivolts
0–100 microamps	100 millivolts
0–1 milliamp	100 millivolts
0–10 milliamps	100 millivolts
0–100 milliamps	100 millivolts
Accuracy:	±0.1% F.S. ±1 digit 25°C±10°C 117 volts±10%
Readings Per Second:	6/second (Std.)
Common Mode Rejection:	80 DB at 60 Hz
Normal Mode Rejection:	35 DB at 60 Hz
Power Requirements:	117 volts ±10% 60 to 400 Hz (50 Hz on special order)
Response Time:	<1 second
Weight:	Approximately 1¼ lbs.

See Page 17 For Mounting Dimensions.


Rear view of Model 1290 showing connector removed (supplied as an accessory).

WESTON
MILLIVOLTS D.C.
±1 9 9.9

MODEL 1292 BI-POLAR DPM

The latest addition to Weston's miniaturized line of digital panel meters provides automatic bi-polar operations with extremely high input impedance. The Model 1292 is a bi-polar, 3½ digit unit, that provides an input impedance greater than 100 megohms on a 100-millivolt range and greater than 1000 megohms on a 1-volt range. An input impedance of 10 megohms is provided on all other voltage ranges.

Another outstanding feature of the Model 1292 concerns the measuring circuitry which utilizes dual-slope integration (Weston patent 3,051,939). Separate references are used for both end points of the range, thus making the zero point independent of end scale adjustments. This feature makes it easier to adjust end scale points and provides greater stability at zero input.

Available in voltage ranges of from 100 millivolts to 1000 volts and in current ranges of from 1 microamp to 100 milliamps, the Model 1292 features include 0.1% Full Scale ±1 digit accuracy, 100% Over-range, Common Mode Rejection of 80 DB at 60 Hz, Normal Mode Rejection of 35 DB at 60 Hz, 1-2-4-8 BCD Output, Full Storage Display, complete front panel mounting and chassis removal, sampling rates tied to phased-locked fundamentals of 60 Hz for excellent noise rejection characteristics, circularly polarizing viewing window, Remote Hold, decimal points wired out, and "Plug-in" Nixie® tubes. Power requirements are 117 volts ±10%, 60 to 400 Hz (50 Hz on special order), less than 7 watts.

The entire unit, including polarity and out range indicators, is packaged in the standard Model 1290 case which occupies only 7 square inches of panel space.

The Model 1292 DPM is priced below $200 in quantities of 100 units.

MODEL 1292 FEATURES

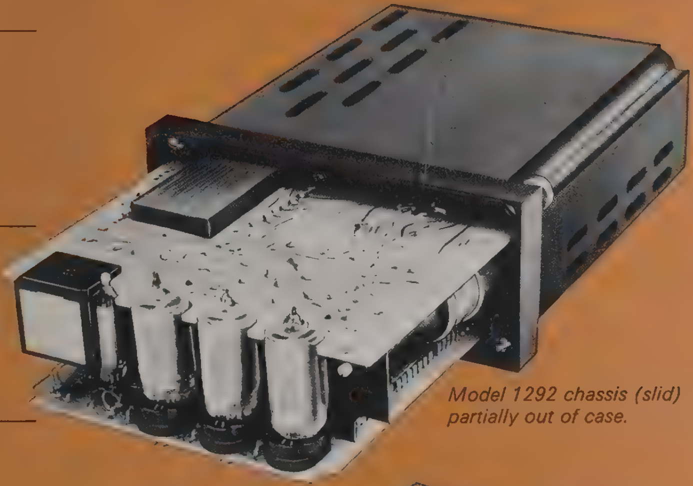
1. 100% over-range (except for 1000 volt range).
2. Takes only 7 square inches of panel space— less than any other DPM on the market.
3. Complete 1292 can be mounted entirely from front of panel.
4. Complete chassis removal from front of panel— can be exchanged with new chassis in less than 30 seconds.
5. BCD output is standard.
6. Separate references provided for positive and negative measurements.
7. Highest input impedance available.
8. Sampling rates tied to phase-locked fundamentals of 60 Hz for excellent noise rejection characteristics.
9. Circuit boards "Repairable"—not potted.
10. Top rated components including Burroughs Nixie® tubes.

® Registered trademark Burroughs Corp.

MODEL 1292

SPECIFICATIONS	MODEL 1292
Ranges:	
Volts	**Input Impedance**
0–100 millivolts	100 megohms
0–1 volt	1000 megohms
0–10 volts	10 megohms
0–100 volts	10 megohms
0–1000 volts	10 megohms
Current:	
0–1 microamp	100 K ohms
0–10 microamps	10 K ohms
0–100 microamps	1 K ohm
0–1 milliamp	100 ohms
0–10 milliamps	10 ohms
0–100 milliamps	1 ohm
Accuracy:	±0.1% full scale ±1 digit
Out of Range Indicator:	±300% (except for 1000 volt range)–Indicates when unit is above or below standard range
Extreme Temperature Operating Range:	5°C to 45°C
Storage Temperature:	—40°C to 70°C
Common Mode Rejection:	80 DB with 1000 ohm input unbalance at 60 Hz
Normal Mode Rejection:	35 DB at 60 Hz
Readings Per Second:	0.2
Response Time:	<2 seconds
Power Requirements:	117 volts ±10%, 60 to 400 Hz –7 watts
Weight:	Approximately 1¼ lbs.

See Page 17 For Mounting Dimensions.

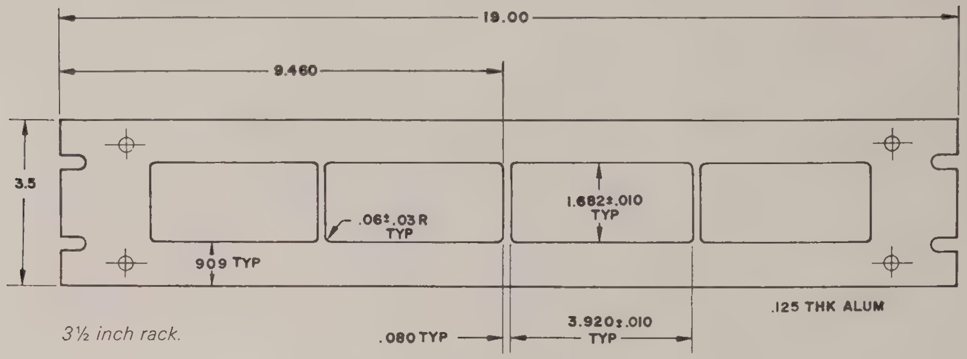


Model 1292 chassis (slid) partially out of case.

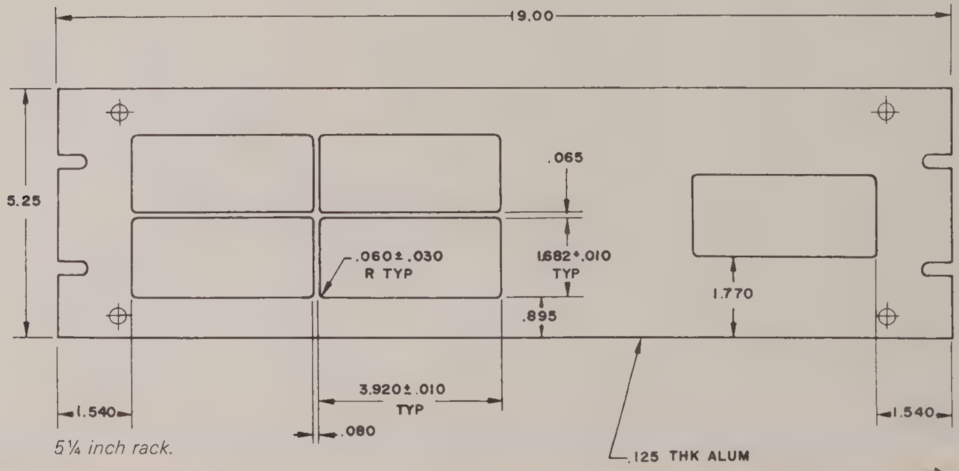
Rear view of Model 1292 showing connectors removed (supplied as accessories).

TYPICAL MOUNTING ARRANGEMENTS

FOR ALL DIGITAL PANEL METERS EXCEPT 1280.

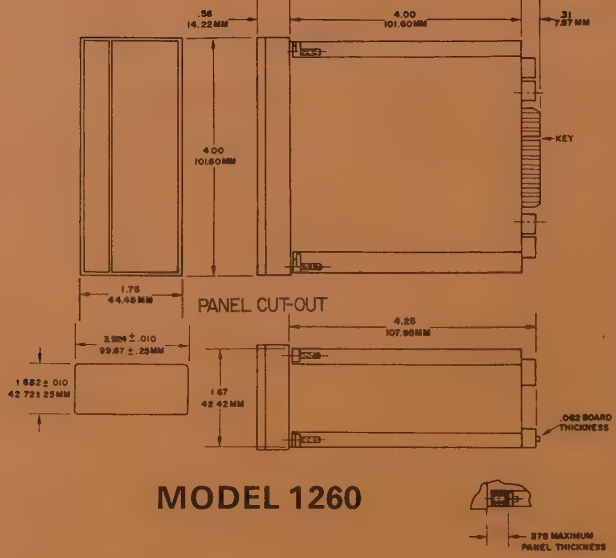

19.00
9.460
3.5
.06±.03 R TYP
1.682±.010 TYP
909 TYP
.125 THK ALUM
.080 TYP
3.920±.010 TYP

3½ inch rack.

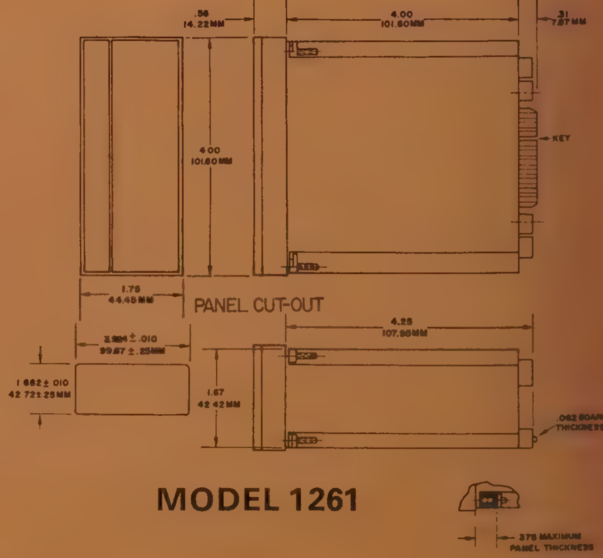

19.00
5.25
.065
.060±.030 R TYP
1.682±.010 TYP
.895
1.770
1.540
3.920±.010 TYP
.080
1.540
.125 THK ALUM

5¼ inch rack.

DIGITAL PANEL METER DIMENSIONS

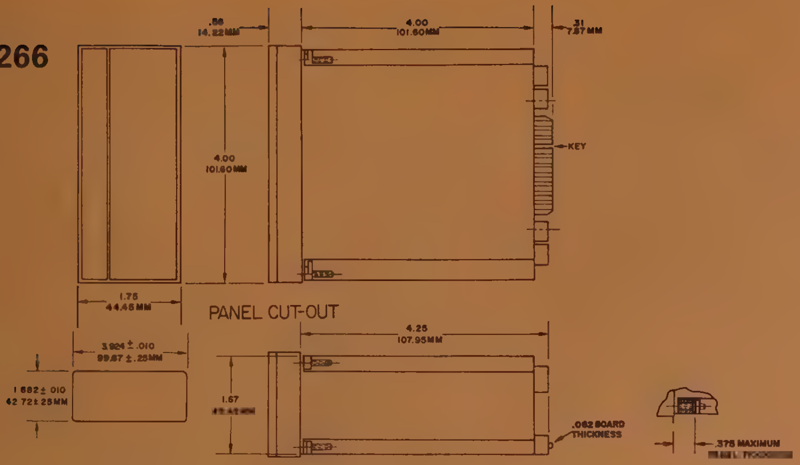

.56
14.22MM
4.00
101.60MM
.31
7.87MM
4.00
101.60MM
KEY
1.75
44.45MM
PANEL CUT-OUT
3.924±.010
99.67±.25MM
1.682±.010
42.72±.25MM
1.67
42.42MM
4.25
107.95MM
.062 BOARD THICKNESS
.375 MAXIMUM PANEL THICKNESS

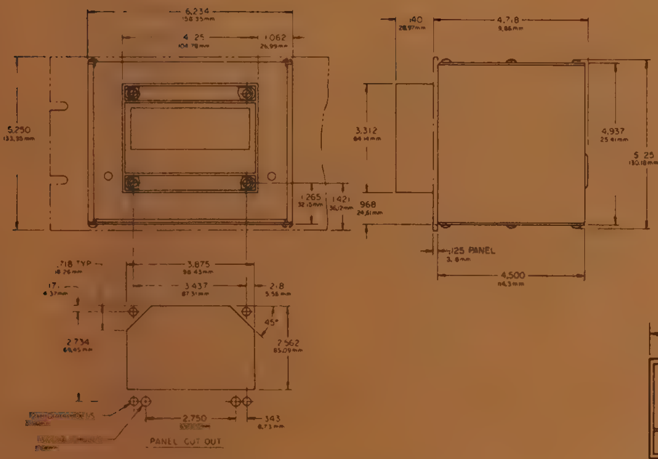
MODEL 1260


.56
14.22MM
4.00
101.60MM
.31
7.87MM
4.00
101.60MM
KEY
1.75
44.45MM
PANEL CUT-OUT
3.924±.010
99.67±.25MM
1.682±.010
42.72±.25MM
1.67
42.42MM
4.25
107.95MM
.062 BOARD THICKNESS
.375 MAXIMUM PANEL THICKNESS

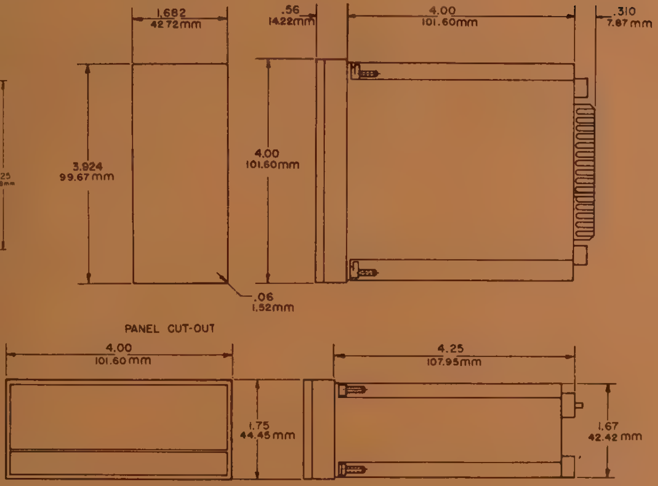
MODEL 1261

MODEL 1266


.56
14.22MM
4.00
101.60MM
.31
7.87MM
4.00
101.60MM
KEY
1.75
44.45MM
PANEL CUT-OUT
3.924 ± .010
99.67 ± .25MM
1.682 ± .010
42.72 ± .25MM
4.25
107.95MM
1.67
.062 BOARD
THICKNESS
.375 MAXIMUM

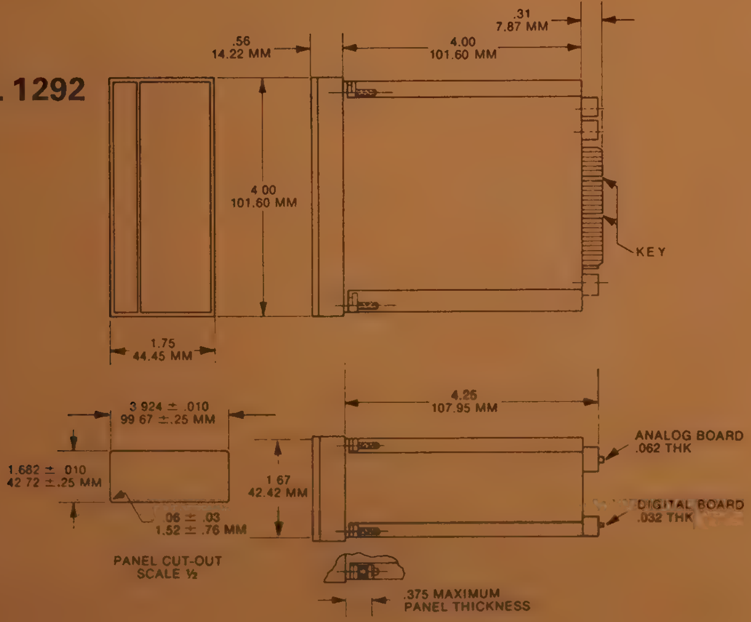

6.234
158.35mm
4.25
104.78mm
1.062
26.99mm
5.250
133.35mm
1.265
32.15mm
1.421
36.12mm
.968
24.61mm
.140
28.97mm
4.718
3.312
4.937
5.25
130.18mm
.125 PANEL
3.6mm
4.500
114.3mm
.718 TYP
18.26mm
.172
4.37mm
3.875
98.43mm
3.437
87.31mm
.218
5.56mm
45°
2.734
69.45mm
2.562
65.09mm
2.750
.343
8.73mm
PANEL CUT OUT

MODEL 1280

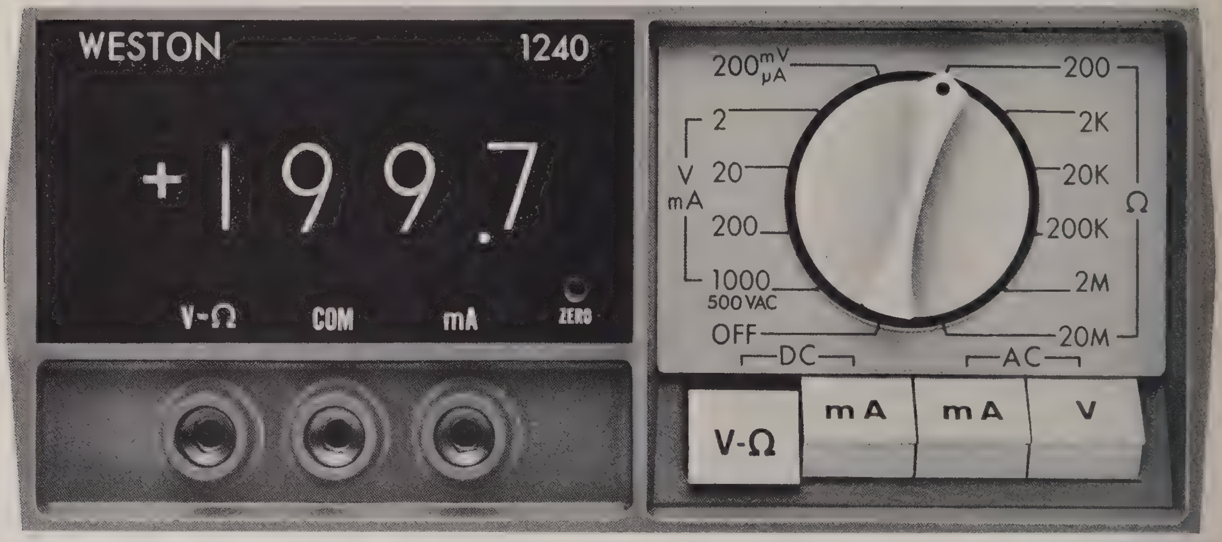

1.682
42.72mm
.56
14.22mm
4.00
101.60mm
.310
7.87mm
3.924
99.67mm
4.00
101.60mm
.06
1.52mm
PANEL CUT-OUT
4.00
101.60mm
1.75
44.45mm
4.25
107.95mm
1.67
42.42mm

MODEL 1290

MODEL 1292


.56
14.22 MM
4.00
101.60 MM
.31
7.87 MM
4.00
101.60 MM
KEY
1.75
44.45 MM
3.924 ± .010
99.67 ± .25 MM
1.682 ± .010
42.72 ± .25 MM
.06 ± .03
1.52 ± .76 MM
PANEL CUT-OUT
SCALE ½
4.25
107.95 MM
1.67
42.42 MM
ANALOG BOARD
.062 THK
DIGITAL BOARD
.032 THK
.375 MAXIMUM
PANEL THICKNESS

MODEL 1240 DIGITAL MULTIMETER



ACTUAL SIZE

GENERAL DESCRIPTION

The Weston Model 1240 is a new compact Digital Multimeter with 26 ranges for measuring DC and AC voltage, DC and AC current and resistance.

Operator convenience has been stressed in its straightforward control layout which includes a single range selector and feather touch function switches. Long life is assured thru the use of overload protection on all circuits along with a glass filled thermoplastic case for shock resistance. Superior mechanical features are offered such as fully-recessed controls, adjustable tilt stand and carrying handles, all protection fuses replaceable without opening case, standard unit will "rack mount", and battery pack which plugs into the back will permit the Model 1240 to be transported in a standard attache case.

The heart of the multimeter circuitry is a high-impedance bipolar A/D converter operating on the dual-slope principle (Weston patent no. 3,051,939). It has a basic range of 200 millivolts and achieves its high impedance by means of potentiometric feedback around its integrator. All other ranges and functions are first converted to this basic DC range for measurement by the A/D converter.

AC is converted to DC by an average-sensing RMS calibrated converter assembly. Current is measured by the voltage drop it establishes across a precision ring shunt network. Resistance is measured by passing a scaled constant current through the unknown and measuring the DC voltage across it.

All circuits on the 1240 are protected for overloads either through a resistor-diode network, or through fuses, which are replaceable from outside of the case. Two fuses are located behind the input jacks on the case front, the third fuse is found behind the AC line input receptacle on the back panel. All fuses may be reached by simply removing the related receptacles. Removal tools have been provided on the ends of the portahandle locking knobs. A high-impact, shock-resistant plastic case protects the system in virtually every field environment.

FEATURES

- All protection fuses replaceable without opening case.
- Standard unit will panel mount without need for any accessory parts.
- Completely portable
    - Weighs only 4 pounds
    - Shock resistant case
    - Less than 3" high, fits into standard attache case
    - Battery pack available
    - Carrying case available
- All switches can be operated by one hand.
- Adjustable tilt stand also serves as carrying handle.
- Uses quality components.
- 200 millivolt range allows use of many Weston transducers such as DC shunts.
- Leather carrying case available.
- Protected for overloads.
  (This includes all OHM ranges).

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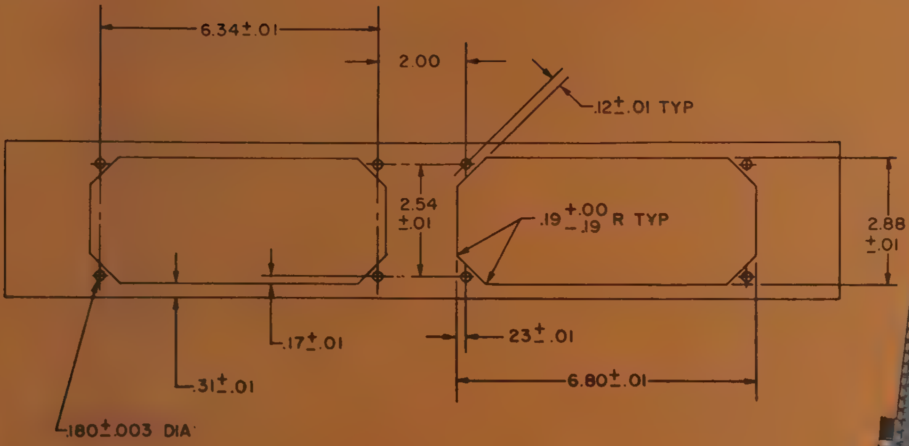
WESTON
1240
200
2
20
200
1000
OFF
DC
AC
2K
20K
200K
2M
20M
V Ω
mA
mA
V

Model 1240 fuse replacement

Model 1240 panel mounted

WESTON
1240
+1999
V-Ω
COM
mA
200 mA μA
2
V 20
mA
200
1000
OFF
DC
AC
200
2K
20K
200K
2M
20M
Ω
V Ω
mA
mA
V


6.34 ± .01
2.00
.12 ± .01 TYP
2.54
±.01
.19 +.00 −.19 R TYP
2.88
±.01
.17 ± .01
.23 ± .01
.31 ± .01
6.80 ± .01
.180 ± .003 DIA

Panel (3.5 x 19.0 x .125 THK
MODEL 1240, 1241

Model 1240 carried by handle
contained in optional
carrying case.

MODEL 1240/1241 GENERAL SPECIFICATIONS

SPECIFICATIONS
Model 1240 AC/DC Multimeter

D.C. VOLTS

RANGES	RATED ACCURACY	INPUT IMPEDANCE
0–0.2 V	0.1% Rdg. ±1 Digit on all ranges	100 M
0–2 V		1000 M
0–20 V		10 M
0–200 V		10 M
0–1000 V		10 M

D.C. AMPS

RANGES	RATED ACCURACY	VOLTAGE DROP (NOMINAL)
200 uA	±0.25% Rdg. ±1 Digit	0.2 V on all ranges
2 MA	±0.2% Rdg. ±1 Digit	
20 MA	±0.2% Rdg. ±1 Digit	
200 MA	±0.3% Rdg. ±1 Digit	
2 A	±0.5% Rdg. ±1 Digit	

A.C. VOLTS

RANGES	RATED ACCURACY	INPUT IMPEDANCE
200 MV	0.5% Rdg. ±1 Digit on all ranges	1 Megohm on all ranges
2 V		
20 V		
200 V		
500 V		
FREQUENCY RANGE	40 Hz to 10 K Hz 1% Rdg. ± 1 Digit for 10 K Hz to 20 K Hz Frequency Range	

A.C. AMPS

RANGES	RATED ACCURACY	VOLTAGE DROP (NOMINAL)
200 uA	0.75% Rdg. ± 1 Digit	0.2 V on all ranges
2 MA	0.7% Rdg. ± 1 Digit	
20 MA	0.7% Rdg.± 1 Digit	
200 MA	0.8% Rdg. ± 1 Digit	
2A	1% Rdg. ± 1 Digit	

FREQUENCY RANGE: 40 Hz to 10 K Hz

OHMS

RANGES	ACCURACY	CURRENT OUTPUT	MAX. V APPLIED
200 ohms	0.5% Rdg. ± 1 Digit	1 MA	0.2 V
2 K ohms	0.5% Rdg. ± 1 Digit	100 uA	0.2 V
20 K ohms	0.5% Rdg. ± 1 Digit	10 uA	0.2 V
200 K ohms	0.5% Rdg. ± 1 Digit	10 uA	2 V
2 M ohms	0.5% Rdg. ± 1 Digit	1 uA	2 V
20 M ohms	± 1 Rdg.	100 nA	2 V

Out-of-Range Indication:	Flashing light indicates when unit is out-of-range.
Polarity Indication:	Lighted sign automatically indicates polarity.
Temperature Range:	10°—40°C
Temperature Influence:	±0.005% Rdg./°C ±0.005% FS/°C
Humidity:	85% humidity at 36°C
Vibration:	5—10 Hz for 1 hour at 0.4 G 10—50 Hz for 11 milliseconds at 2 G
Shock:	50 G on 3 axes
CMR:	80 DB at 60 Hz with 1000 ohm unbalance
NMR:	35 DB at 60 Hz
Readings/Second:	5 (Non-blinking display)
Input Power:	115 or 230 V + 15%, −10%, 6 watts nominal, from 50—400 Hz
Size:	7″ W x 3″ H x 7.9″ D
Weight:	4 lbs.

SPECIFICATIONS Model 1241 Volt Ohmmeter

D.C. VOLTS

RANGES	RATED ACCURACY	INPUT IMPEDANCE
0–0.2 V	0.1% Rdg. ±1 Digit on all ranges	100 M
0–2 V		1000 M
0–20 V		10 M
0–200 V		10 M
0–1000 V		10 M

OHMS

RANGES	ACCURACY	CURRENT OUTPUT	MAX. V APPLIED
200 ohms	0.5% Rdg. ± 1 Digit	1 MA	0.2 V
2 K ohms	0.5% Rdg. ± 1 Digit	100 uA	0.2 V
20 K ohms	0.5% Rdg. ± 1 Digit	10 uA	0.2 V
200 K ohms	0.5% Rdg. ± 1 Digit	10 uA	2 V
2 M ohms	0.5% Rdg. ± 1 Digit	1 uA	2 V
20 M ohms	± 1 Rdg.	100 nA	2 V

MEASURING TECHNIQUE

DUAL SLOPE CONVERSION

Dual slope is an integrating method of A/D conversion which, has the capability of rejecting power frequency noise resulting from normal-mode or power supply disturbances. Integrating time in the Model 1240 is 200 milliseconds, providing excellent rejection of 50hz, 60hz, 400hz or any other disturbances whose periods are submultiples of 200 MS.

Dual Slope has an added advantage over other integrating systems. Older systems converted amplitude to time, to be digitized by counting clock pulses. Dual Slope, by contrast, converts amplitude into a ratio of two time intervals, both dependent on clock period, so that clock inaccuracies cancel out. Figures 1 and 2 show the integration circuit and waveforms which provide this unique advantage.

Integrating cycle time of 200 milliseconds (or 8000 clock pulses) is divided into two intervals. During t_1 the integrator ramps up, under control of E_{in}, to a voltage $E_{in}t_1/RC$. During t_2, the capacitor discharges an equal amount to zero under the influence of E_{in} and I ref such that

$$\frac{E_{in}t_1}{RC} = \left(I_{ref} - \frac{E_{in}}{R}\right)\frac{t_2}{C}$$

Since $t_1 + t_2 = T$,

$$T_2 = \frac{E_{in}\ T}{I_{ref}R}$$

The number of clock pulses N2 counted during t_2 is the number displayed. Since $N2 = t_2 \times f$ clock and

$$T = 8000/f \text{ clock}$$

$$N2 = \frac{8000\ \ E_{in}}{I_{ref}\ R}$$

The scale factor of the instrument then depends only on the stability of a current source and a stable resistor.

Figure 1

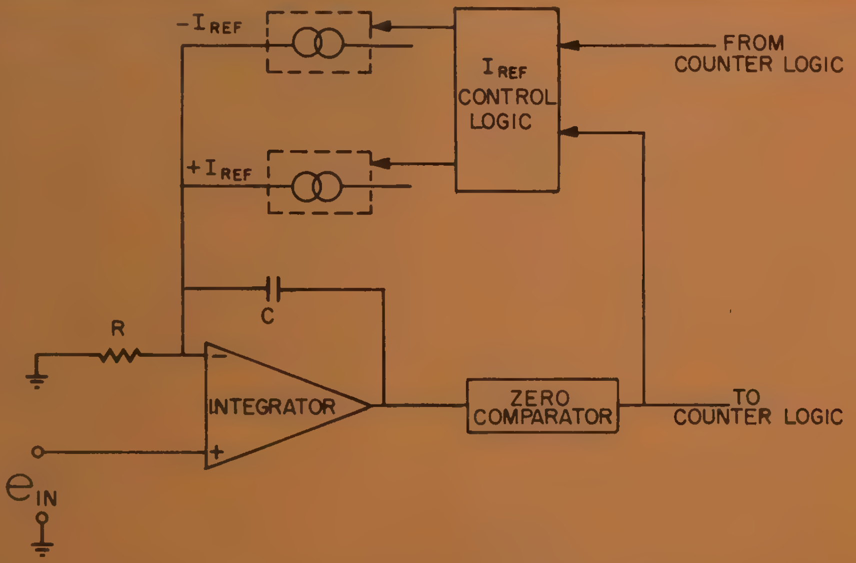
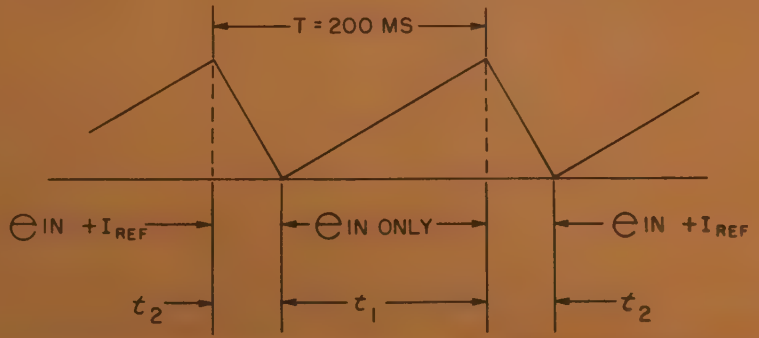


Figure 2



BATTERY PACK

The Model 9740–270520 is a battery powered supply capable of operating a Weston Model 1240 or 1241 for approximately 6 hours. Recharge time is in the order of sixteen hours. Number of recharge cycles typically possible with a single battery is a minimum of 100.

It is packaged in a leather case approximately 7⅜" wide x 3⅜" high x 17" deep. Of the 17 inches depth approximately 8 inches will be allocated to house the digital multimeter, 2½ inches for the test lead compartment and 5½ inches for the battery pack. The battery pack is a self-contained unit capable of being operated with the digital multimeter in the leather case or when both are removed from the leather case. Contained within the battery pack will be space for the 12 volt battery (not supplied with battery pack), and all electronics and controls necessary to interface with the digital multimeter. The battery is a standard Globe gel/cell GC 1245 and must be ordered separately.

SPECIFICATIONS

Operating Modes A selector switch is provided on the top of the battery housing to provide three modes of operation from the battery pack.

1. "Battery" In this mode of operation, the battery pack will supply energy to operate the attached digital multimeter when its range switch is in any position but OFF.

2. "Line" In this mode, the battery pack circuitry is bypassed and the digital multimeter operated directly from a 115 or a 230 volt line, depending upon the setting of the AC line voltage switch on the multimeter.

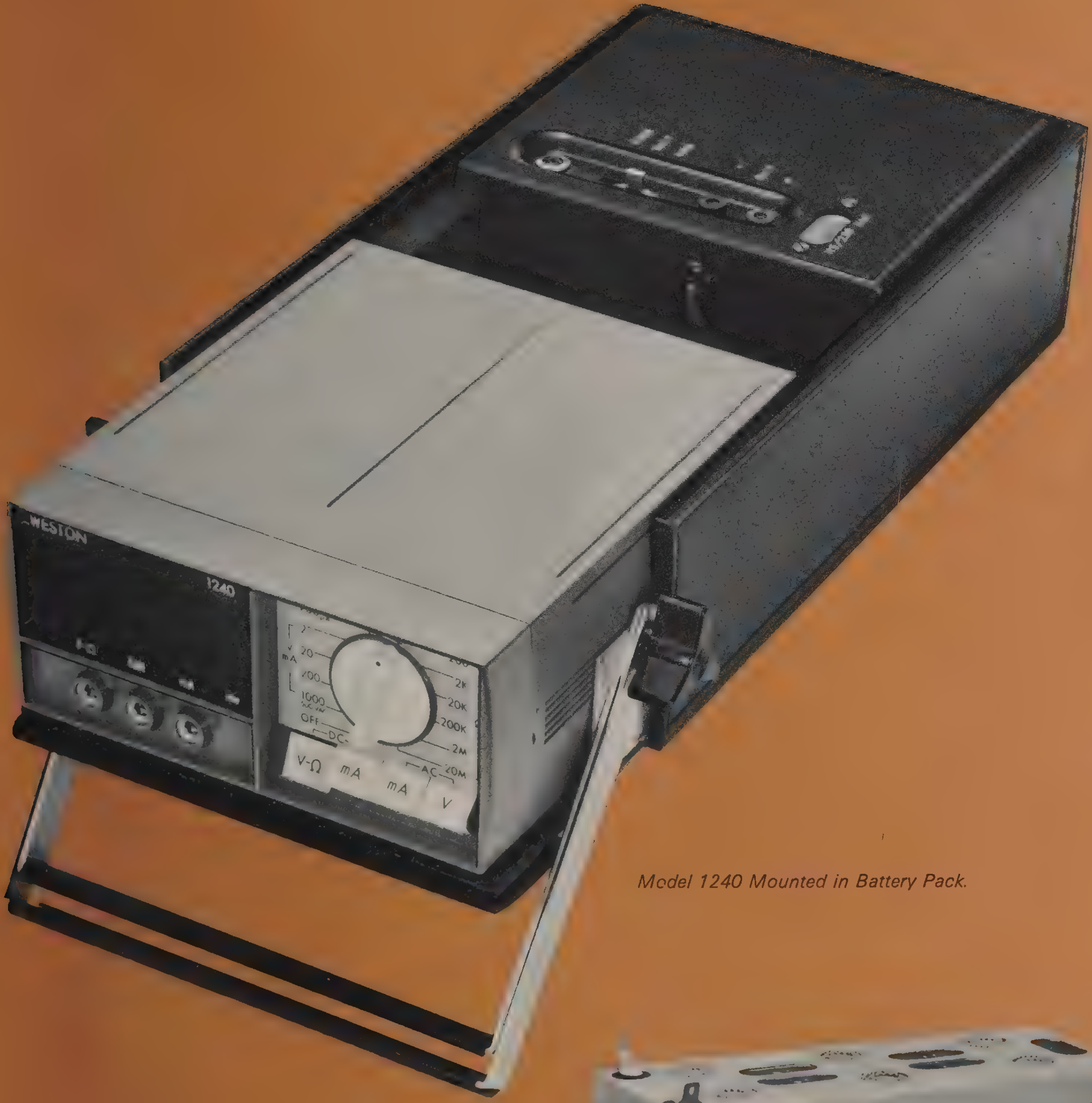
3. "Charge" In this mode of operation, the twelve volt battery located in the battery pack is recharged. Charging may be from a 115 or a 230 volt AC line. As is the case with line operation, the slide switch on the multimeter must be appropriately set to 115 or its 230 volt position.

Test Jacks The battery pack has two test jacks located on it to permit checking the battery voltage. These jacks may also be used to permit operation of the multimeter from an external 12 volt supply if required.

Accessory Connector The cable between the battery pack and the multimeter will be designed to permit operation either in the carrying case or on a bench top without the leather case.

Temperature The complete battery pack can be operated over the full operating range of the digital multimeter.

BATTERY PACK


WESTON
1240
OFF
DC
AC
200
1000
2K
20K
200K
2M
20M
V-Ω
mA
mA
V

Model 1240 Mounted in Battery Pack.

GLOBE
gel/cell
GLOBE RECHARGEABLE BATTERY
GC 1245-1 12 VOLT 4.5 AMP-HR

BATTERY

The battery is a standard Globe gel/cell GC 1245, 12 volt unit stocked under number 9740-270145. This type of battery has special characteristics which makes it particularly suitable for use in the battery pack listed above. It is completely sealed.

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614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
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07-104-C 3/70 PK

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WESTON®

DIGITAL INSTRUMENTS

MODELS
1260, 1261, 1262, 1266, 1290, 1292
1294, 1240, 1241

PRICE LIST
07–104
Effective
December 1, 1970
Supersedes 8/1/70

All Prices Subject to Change Without Notice and are F.O.B. Factory, Newark, N.J.

MODEL 1260 D.C. VOLTMETERS

Range	Catalog No.	Price
0-199 MV	1260-0267381	$133.00
0-1.99 V	1260-0267382	$133.00
0-19.9 V	1260-0267383	$133.00
0-199 V	1260-0267384	$133.00
0-1 Kilovolt	1260-0267385	$133.00

MODEL 1260 D.C. MICROAMMETERS

Range	Catalog No.	Price
0-19.9 μa	1260 0267386	$133.00
0-199 μa	1260-0267387	$133.00

MODEL 1260 D.C. MILLIAMMETERS

Range	Catalog No.	Price
0-1.99 MA	1260-0267388	$133.00
0-19.9 MA	1260-0267389	$133.00
0-199 MA	1260-0267390	$133.00

PC Board Connector for Model 1260 (Includes Mounting Screws)
Catalog No. 9760 - 0267432 - $3.00 List.

MODEL 1261 3 DIGIT DPM

For Pricing Contact Local WESTON Office

PC Board Connector for Model 1261 (Includes Mounting Screws)
Catalog No. 9760 - 0267432 - $3.00 List.

MODEL 1262 AC LINE MONITOR

Range	Catalog No.	Price
100-130 Volts	1262-0271396	$195.00

PC Board connector for Model 1262 (Includes Mtg. Screws).
Catalog No. 9760-0267432 $3.00 List

MODEL 1266 EVENT COUNTER

Range	Catalog No.	Price
999	1266-0270486	$130.00

PC Board connector for Model 1266 (Includes Mtg. Screws)
Catalog No. 9760-0267432 $3.00 List.

MODEL 1290 DC VOLTMETERS

Range	Catalog No.	Price
100 MV	1290-0267290	$260.00
1 V	1290-0267291	$260.00
10 V	1290-0267292	$260.00
100 V	1290-0267293	$260.00
1000 V	1290-0267294	$260.00

MODEL 1290 DC MILLIAMMETER

Range	Catalog No.	Price
1 MA	1290-0267297	$260.00
10 MA	1290-0267298	$260.00
100 MA	1290-0267299	$260.00

MODEL 1290 DC MICROAMMETER

Range	Catalog No.	Price
10 μa	1290-0267295	$260.00
100 μa	1290-0267296	$260.00

P.C. BOARD CONNECTOR KIT FOR MODEL 1290 (INCLUDES MTG. SCREWS)

Catalog No. 9790-0267253 - $3.75 List

MODEL 1292 D.C. VOLTMETERS

Range	Catalog No.	Price
100 MV	1292-0270200	$283.00
1 V	1292-0270201	$283.00
10 V	1292-0270202	$283.00
100 V	1292-0270203	$283.00
1000 V	1292-0270204	$283.00

MODEL 1292 D.C. MILLIAMMETERS

Range	Catalog No.	Price
1 MA	1292-0270208	$283.00
10 MA	1292-0270210	$283.00
100 MA	1292- 0270211	$283.00

MODEL 1292 D.C. MICROAMMETERS

Range	Catalog No.	Price
1 μ a	1292-0270205	$283.00
10 μ a	1292-0270206	$283.00
100 μ a	1292-0270207	$283.00

PC Board Connectors for Models 1292 and 1294 (Includes Mounting Screws) Analog & Power Connector Cat No. 9790-0267253- $3.75 List. BCD Output Connector Cat. No. 9790-0271102- $3.00 List.

MODEL 1294 D.C. VOLTMETERS

Range	Catalog No.	Price
100 MV	1294-0270600	$375.00
1 V	1294-0270601	$350.00
10 V	1294-0270602	$350.00
100 V	1294-0270603	$350.00
1000 V	1294-0270604	$350.00

MODEL 1294 D.C. MICROAMMETERS

Range	Catalog No.	Price
10 μa	1294-0270605	$350.00
100 μa	1294-0270606	$350.00

MODEL 1294 D.C. MILLIAMMETERS

Range	Catalog No.	Price
1 MA	1294-0270607	$350.00
10 MA	1294-0270608	$350.00
100 MA	1294-0270609	$350.00

MULTIMETERS

Model	Catalog No.	Price
1240	0267325	$394.50
1241	0269070	$289.00

Battery Pack Model 9740
Cat. No. 9740-270520 . . . . Price $99.60

Battery (12 Volt for 9740-270520)
Cat. No. 9740-270145 . . . . Price $30.00

LEATHER CARRYING CASE Model 9740

Catalog No. 0269562 . . . . Price $19.50

FUSES

Model	Part No.	Size	Type	Price
9999	269937	3/16A	8AG	$.60
9999	269938	3A	8AG	$.30
9999	ND-29787	1/4A	8AG	$.20

INPUT LEADS (1 pair supplied with meter at no charge.)
PART NO. 270066 . . . . Price $4.15

POWER CORD (Power cord supplied with meter at no charge.)
PART NO. 269985 . . . . Price $1.75

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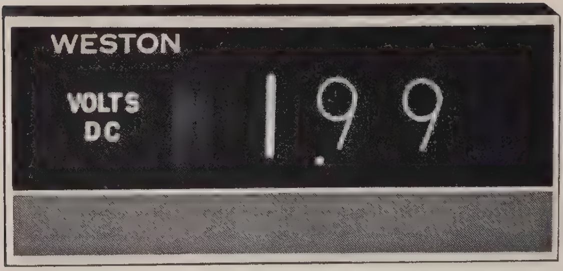
NEW

WESTON
VOLTS
DC
1.99

Model 1260 Digital Panel Meter

MODEL 1260 ECONOMY DPM



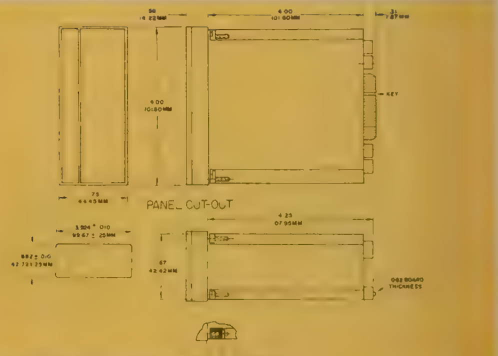
Weston has developed an economy Digital Panel Meter which is priced in an area truly compatible with analog instruments. The new Model 1260 is a 2½ digit unit priced below $100. in quantities of 25. To achieve a design with a selling price below $100. requires an approach having the simplicity of dual slope integration (Weston patents 3,051,939 and 3,316,547) but with considerably fewer components. To satisfy these requirements Weston engineering developed a novel voltage-to-time converter capable of being packaged with its complete power supply and readout on a single side of a printed circuit board, having approximate dimensions of 4″ x 3″. This new circuit achieves the cost objectives without sacrificing high normal and common mode rejection with a non-blinking readout.

The Model 1260 fits into 7 square inches of panel and mounts completely from the front of the panel. The entire chassis pulls out from the front, for servicing operation. Standard features include ±.5% F.S. ±1 digit accuracy and a circularly polarizing window filter. Special features such as BCD output, remote hold and special captions can be supplied on order.

MODEL 1260 FEATURES

- 25% over-range is standard.
- Takes only 7 sq. inches of panel space—less than any other DPM on the market.
- Complete 1260 can be mounted entirely from front of panel.
- Complete chassis removal from front of panel—Can be exchanged with new chassis in less than 30 seconds.
- Sampling rates tied to phased locked fundamentals of 60 Hz for excellent noise rejection characteristics.
- Circularly polarizing viewing window.
- Top rated components including Burroughs Nixies®.
- Circuit boards "Repairable"—Not potted.

SPECIFICATIONS	**MODEL 1260**
Ranges:	
Volts	**Input Resistance**
0-199 millivolts	20K
0-1.99 volts	200K
0-19.9 volts	2 meg
0-199 volts	2 meg
0-1 kilovolts	2 meg
Current:	
0-19.9 microamps	10K
0-199 microamps	1K
0-1.99 milliamps	100 ohms
0-19.9 milliamps	10 ohms
0-199 milliamps	1 ohm
Accuracy:	±.5% full scale ±1 digit. 25°C ± 10°C
Out-of-Range Indication:	Indicates when unit is below or above standard range
Extreme Temp. Operating Range:	5°C to 45°C
Storage Temperature:	−40°C to +70°C
CMR:	80 DB with 1000 ohm unbalance at 60 Hz
NMR:	35 DB at 60 Hz
Readings/Second:	10
Response Time:	Approximately 1 second
Power:	117 volt ±10%, 50 Hz to 400 Hz, about 5 watts
Weight:	Less than 1 lb. (430 grams)

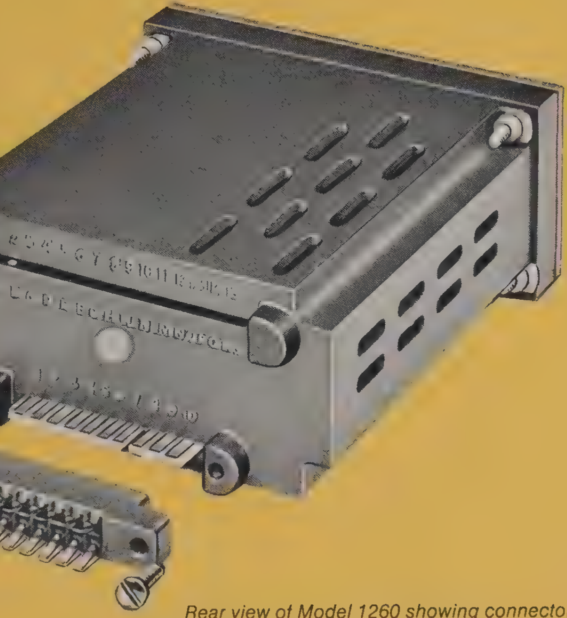


Model 1260 Dimensions.

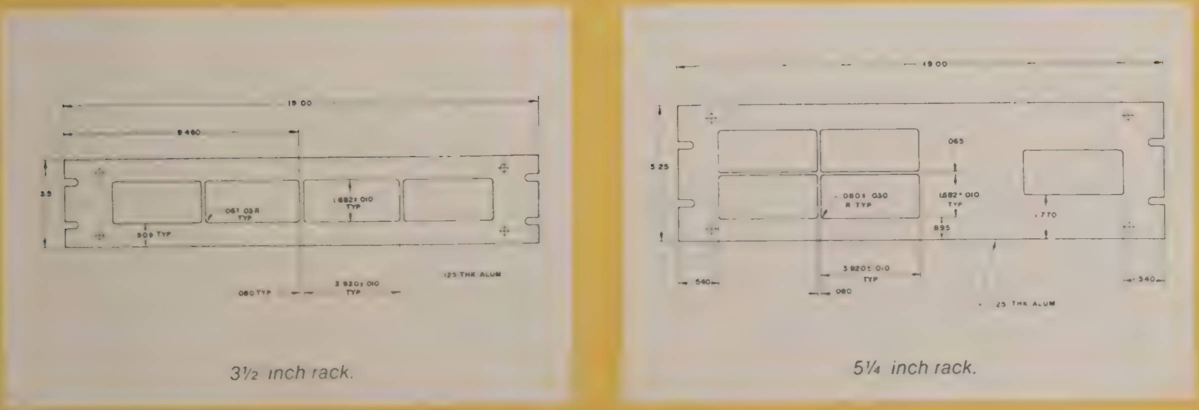
1969 Weston Instruments Inc

MODEL 1260

Model 1260 chassis (slid) partially out of case.



Rear view of Model 1260 showing connector removed (supplied as an accessory).


19 00
9 460
3.5
061 03 R TYP
1 682± 010 TYP
909 TYP
125 THK ALUM
080 TYP
3 920± 010 TYP
19 00
5 25
065
080± 030 R TYP
1.682± 010 TYP
895
770
3 920± 010 TYP
540
540
080
25 THK ALUM

3½ inch rack. *5¼ inch rack.*

Typical mounting arrangements in standard 19 inch pack.

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07-105-A 10/69PS

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WESTON
MILLIVOLTS D.C.
±1999

NEW
BI POLAR

Model 1292 Bi-Polar Digital Panel Meter

MODEL 1292 BI-POLAR DPM

WESTON
MILLIVOLTS D.C.
±1 9 9.9

The latest addition to Weston's miniaturized line of digital panel meters provides automatic bi-polar operations with extremely high input impedance. The Model 1292 is a bi-polar, 3½ digit unit, that provides an input impedance greater than 100 megohms on a 100-millivolt range and greater than 1,000 megohms on a 1-volt range. An input impedance of 10 megohms is provided on all other voltage ranges.

Another outstanding feature of the Model 1292 concerns the measuring circuitry which utilizes dual-slope integration (Weston patent 3,051,939). Separate references are used for both end points of the range, thus making the zero point independent of end scale adjustments. This feature makes it easier to adjust end scale points and provides greater stability at zero input.

Available in voltage ranges of from 100 millivolts to 1,000 volts and in current ranges of from 1 microamp to 100 milliamps, the Model 1292 features include 0.1% Full Scale ±1 digit accuracy, 100% Over-range, Common Mode Rejection of 80 dB at 60 H_z, Normal Mode Rejection of 35 dB at 60 H_z, 1-2-4-8 BCD Output, Full Storage Display, complete front panel mounting and chassis removal, sampling rates tied to phased-locked fundamentals of 60 H_z for excellent noise rejection characteristics, circularly polarizing viewing window, Remote Hold, decimal points wired out, and "Plug-in" Nixie* tubes. Power requirements are 117 Volts ±10%, 60-400 H_z (50 H_z on special order), less than 7 watts.

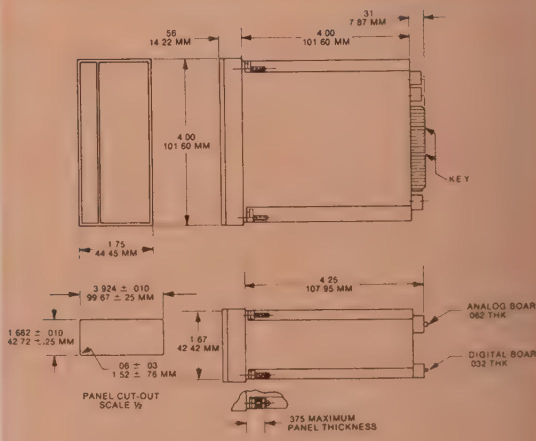
The entire unit, including polarity and out range indicators, is packaged in the standard Model 1290 case which occupies only 7 square inches of panel space.

The Model 1292 DPM is priced below $200 in quantities of 100 units.

MODEL 1292 FEATURES

- 100% over-range (except for 1,000 volt range).
- Takes only 7 sq. inches of panel space–less than any other DPM on the market.
- Complete 1292 can be mounted entirely from front of panel.
- Complete chassis removal from front of panel–can be exchanged with new chassis in less than 30 seconds.
- BCD output is standard.
- Separate references provided for positive and negative measurements.
- Highest input impedance available.
- Sampling rates tied to phase-locked fundamentals of 60 H_z for excellent noise rejection characteristics.
- Circuit boards "Repairable"–Not potted.
- Top rated components including Burroughs Nixie* tubes.

SPECIFICATIONS	MODEL 1292
Ranges:	
Volts	**Input Impedance**
0-100 millivolts	100 meg
0-1 volt	1000 meg
0-10 volts	10 meg
0-100 volts	10 meg
0-1000 volts	10 meg
Current:	
0-1 microamp	100K
0-10 microamps	10K
0-100 microamps	1K
0-1 milliamp	100 ohms
0-10 milliamps	10 ohms
0-100 milliamps	1 ohm
Accuracy:	±0.1% full scale ±1 digit.
Out-of-Range Indication:	±300% (except for 1,000 volt range)–Indicates when unit is above or below standard range
Extreme Temp. Operating Range:	5°C to 45°C
Storage Temperature:	—40°C to 70°C
Common Mode Rejection:	80 DB with 1000 ohm unbalance at 60 H_z
Normal Mode Rejection:	35 DB at 60 H_z
Speed:	0.20 seconds per reading
Response Time:	Less than 2 seconds
Power:	117 volts ±10%, 60 H_z to 400 H_z, 7 watts
Weight:	1 lb. 4 oz.



Model 1292 Dimensions

*Reg. Trademark Burroughs Corp.

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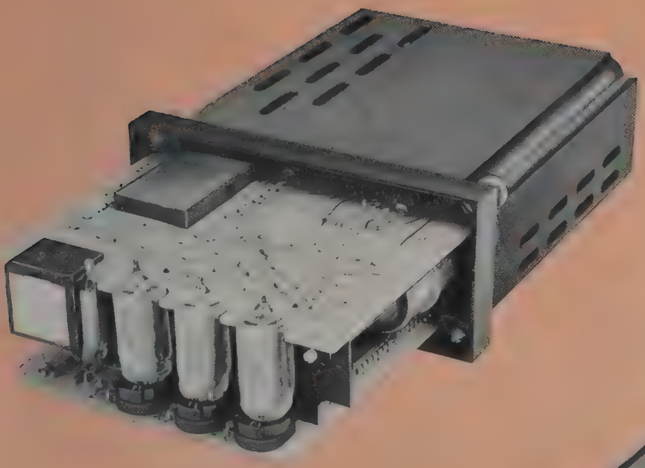
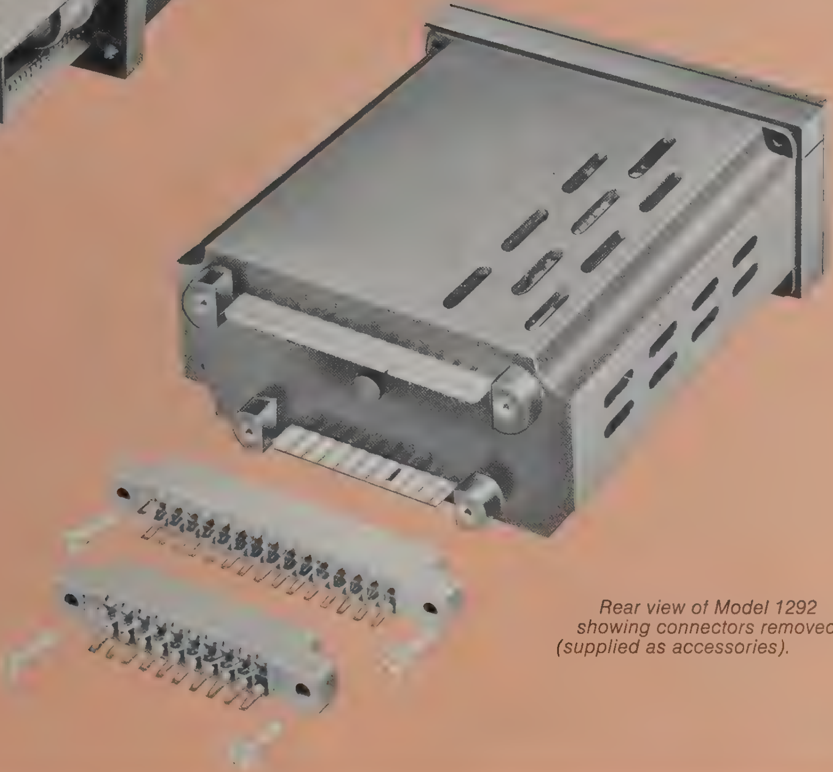
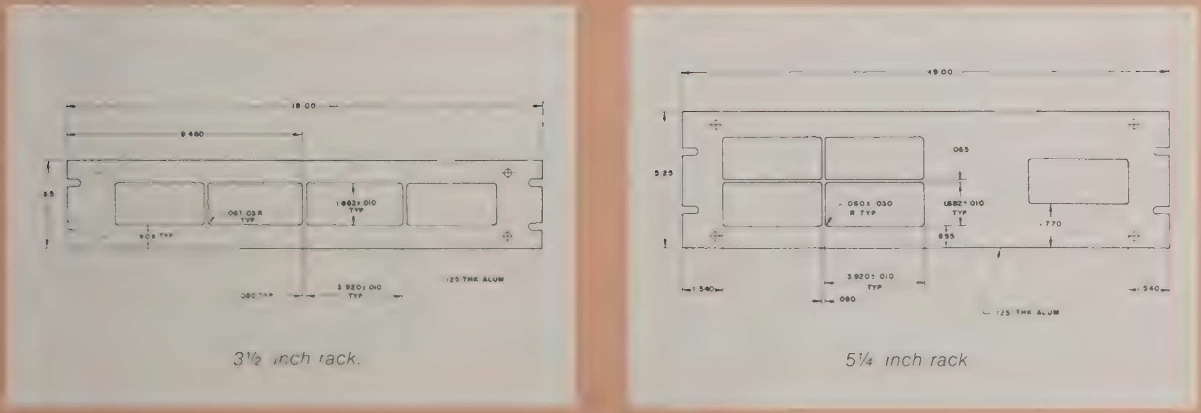


Model 1292 chassis (slid) partially out of case.



Rear view of Model 1292 showing connectors removed (supplied as accessories).


19 00
9 460
3 5
061 03 R TYP
1 682± 010 TYP
909 TYP
125 THK ALUM
080 TYP
3 920± 010 TYP
19 00
5 25
065
- 060± 030 R TYP
1.682± 010 TYP
895
.770
1 540
540
3 920± 010 TYP
080
125 THK ALUM

3½ inch rack.

5¼ inch rack

Typical mounting arrangements in standard 19 inch pack.

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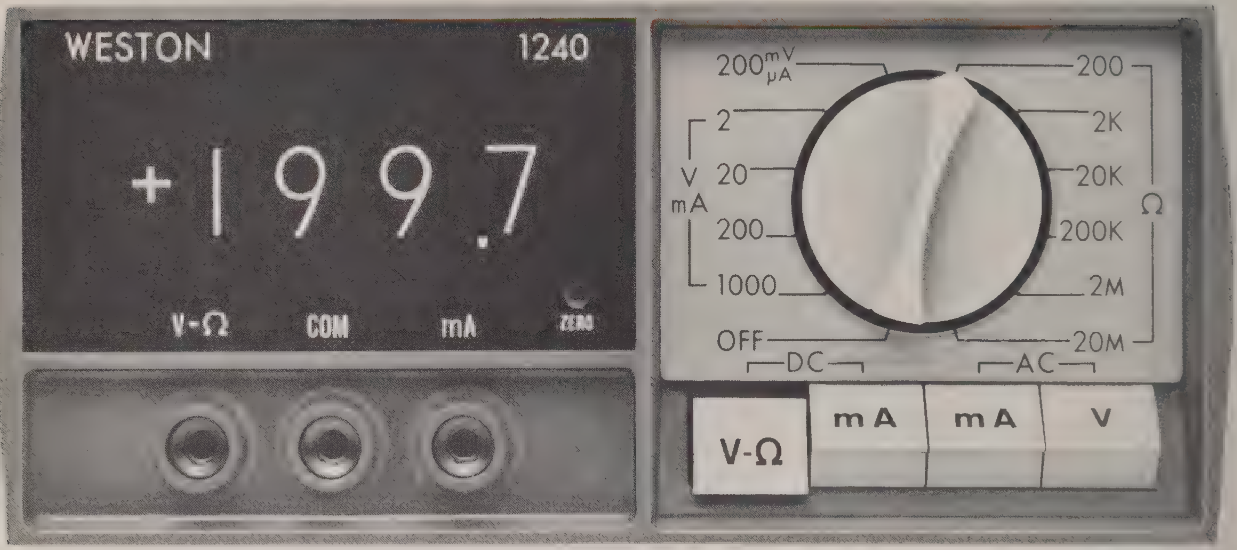
WESTON®

WESTON
1240
+1990
V-Ω
200 mV µA
2
V mA
20
200
1000
OFF
DC
200
2K
20K
200K
2M
20M
AC
Ω
V-Ω
mA
mA
V

AC/DC Digital Multimeter

MODEL 1240 DIGITAL MULTIMETER



ACTUAL SIZE

GENERAL DESCRIPTION

The Weston Model 1240 is a new compact Digital Multimeter with 26 ranges for measuring DC and AC voltage, DC and AC current and resistance.

Operator convenience has been stressed in its straightforward control layout which includes a single range selector and feather touch function switches. Long life is assured thru the use of overload protection on all circuits along with a glass filled thermoplastic case for shock resistance. Superior mechanical features are offered such as fully-recessed controls, adjustable tilt stand and carrying handles, all protection fuses replaceable without opening case, standard unit will "rack mount", and battery pack which plugs into the back will permit the Model 1240 to be transported in a standard attache case.

The heart of the multimeter circuitry is a high-impedance bipolar A/D converter operating on the dual-slope principle (Weston patent no. 3,051,939). It has a basic range of 200 millivolts and achieves its high impedance by means of potentiometric feedback around its integrator. All other ranges and functions are first converted to this basic DC range for measurement by the A/D converter.

AC is converted to DC by an average-sensing RMS calibrated converter assembly. Current is measured by the voltage drop it establishes across a precision ring shunt network. Resistance is measured by passing a scaled constant current through the unknown and measuring the DC voltage across it.

All circuits on the 1240 are protected for overloads either through a resistor-diode network, or through fuses, which are replaceable from outside of the case. Two fuses are located behind the input jacks on the case front, the third fuse is found behind the AC line input receptacle on the back panel. All fuses may be reached by simply removing the related receptacles. Removal tools have been provided on the ends of the portahandle locking knobs. A high-impact, shock-resistant plastic case protects the system in virtually every field environment.

FEATURES

- All protection fuses replaceable without opening the case.
- Standard unit will panel mount without need for any accessory parts.
- Completely portable
  Weighs only 4 pounds
  Shock resistant case
  Less than 3" high, fits into standard attache case
  Battery pack available
  Carrying case available
- All switches can be operated by one hand.
- Adjustable tilt stand also serves as carrying handle.
- Uses quality components.
- 200 millivolt range allows use of many Weston transducers such as DC shunts.

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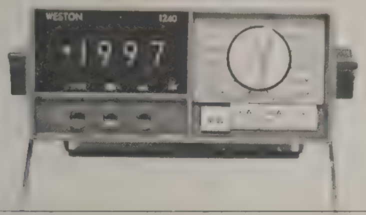
MODEL 1240/1241 GENERAL SPECIFICATIONS



SPECIFICATIONS
Model 1240 AC/DC Multimeter

D.C. VOLTS

RANGES	RATED ACCURACY	INPUT IMPEDANCE
0–0.2 V	0.1% Rdg. ±1 Digit	100 M
0–2 V	on all ranges	1000 M
0–20 V		10 M
0–200 V		10 M
0–1000 V		10 M

D.C. AMPS

RANGES	RATED ACCURACY	VOLTAGE DROP (NOMINAL)
200 uA	±0.25% Rdg. ±1 Digit	0.2 V
2 MA	±0.2% Rdg. ±1 Digit	on all
20 MA	±0.2% Rdg. ±1 Digit	ranges
200 MA	±0.3% Rdg. ±1 Digit	
2 A	±0.5% Rdg. ±1 Digit	

A.C. VOLTS

RANGES	RATED ACCURACY	INPUT IMPEDANCE
200 MV	0.5% Rdg. ±1 Digit	1 Megohm
2 V	on all ranges	on all ranges
20 V		
200 V		
500 V		
FREQUENCY RANGE	40 Hz to 10 K Hz 1% Rdg. ± 1 Digit for 10 K Hz to 20 K Hz Frequency Range	

A.C. AMPS

RANGES	RATED ACCURACY	VOLTAGE DROP (NOMINAL)
200 uA	0.75% Rdg. ± 1 Digit	0.2 V
2 MA	0.7% Rdg. ± 1 Digit	on all
20 MA	0.7% Rdg.± 1 Digit	ranges
200 MA	0.8% Rdg. ± 1 Digit	
2A	1% Rdg. ± 1 Digit	

FREQUENCY RANGE: 40 Hz to 10 K Hz

OHMS

RANGES	ACCURACY	CURRENT OUTPUT	MAX. V APPLIED
200 ohms	0.5% Rdg. ± 1 Digit	1 MA	0.2 V
2 K ohms	0.5% Rdg. ± 1 Digit	100 uA	0.2 V
20 K ohms	0.5% Rdg. ± 1 Digit	10 uA	0.2 V
200 K ohms	0.5% Rdg. ± 1 Digit	10 uA	2 V
2 M ohms	0.5% Rdg. ± 1 Digit	1 uA	2 V
20 M ohms	1 to 2% Rdg.	100 nA	2 V

Out-of-Range Indication:	Flashing light indicates when unit is out-of-range.
Polarity Indication:	Lighted sign automatically indicates polarity.
Temperature Range:	10°—40°C
Temperature Influence:	±0.005% Rdg./°C ±0.005% FS/°C
Humidity:	85% humidity at 36°C
Vibration:	5—10 Hz for 1 hour at 0.4 G 10—50 Hz for 11 milli-seconds at 2 G
Shock:	50 G on 3 axes
CMR:	80 DB at 60 Hz with 1000 ohm unbalance
NMR:	35 DB at 60 Hz
Readings/Second:	5 (Non-blinking display)
Input Power:	115 or 230 V + 15%, −10%, 6 watts nominal, from 50—400 Hz
Size:	7" W x 3" H x 7.9" D
Weight:	4 lbs.

SPECIFICATIONS Model 1241 Volt Ohmmeter

D.C. VOLTS

RANGES	RATED ACCURACY	INPUT IMPEDANCE
0–0.2 V	0.1% Rdg. ±1 Digit	100 M
0–2 V	on all ranges	1000 M
0–20 V		10 M
0–200 V		10 M
0–1000 V		10 M

OHMS

RANGES	ACCURACY	CURRENT OUTPUT	MAX. V APPLIED
200 ohms	0.5% Rdg. ± 1 Digit	1 MA	0.2 V
2 K ohms	0.5% Rdg. ± 1 Digit	100 uA	0.2 V
20 K ohms	0.5% Rdg. ± 1 Digit	10 uA	0.2 V
200 K ohms	0.5% Rdg. ± 1 Digit	10 uA	2 V
2 M ohms	0.5% Rdg. ± 1 Digit	1 uA	2 V
20 M ohms	1 to 2% Rdg.	100 nA	2 V

MEASURING TECHNIQUE

DUAL SLOPE CONVERSION

Dual slope is an integrating method of A/D conversion which, has the capability of rejecting power frequency noise resulting from normal-mode or power supply disturbances. Integrating time in the Model 1240 is 200 milliseconds, providing excellent rejection of 50hz, 60hz, 400hz or any other disturbances whose periods are submultiples of 200 MS.

Dual Slope has an added advantage over other integrating systems. Older systems converted amplitude to time, to be digitized by counting clock pulses. Dual Slope, by contrast, converts amplitude into a ratio of two time intervals, both dependent on clock period, so that clock inaccuracies cancel out. Figures 1 and 2 show the integration circuit and waveforms which provide this unique advantage.

Integrating cycle time of 200 milliseconds (or 8000 clock pulses) is divided into two intervals. During t_1 the integrator ramps up, under control of E_{in}, to a voltage $E_{in}t_1/RC$. During t_2, the capacitor discharges an equal amount to zero under the influence of E_{in} and I ref such that

$$\frac{E_{in}t_1}{RC} = \left(I_{ref} - \frac{E_{in}}{R}\right)\frac{t_2}{C}$$

Since $t_1 + t_2 = T$,
$$T_2 = \frac{E_{in}\ T}{I_{ref}R}$$

The number of clock pulses N2 counted during t_2 is the number displayed. Since $N2 = t_2 \times f$ clock and

$$T = 8000/f\ \text{clock}$$

$$N2 = 8000\,\frac{E_{in}}{I_{ref}\,R}$$

The scale factor of the instrument then depends only on the stability of a current source and a stable resistor.

Figure 1

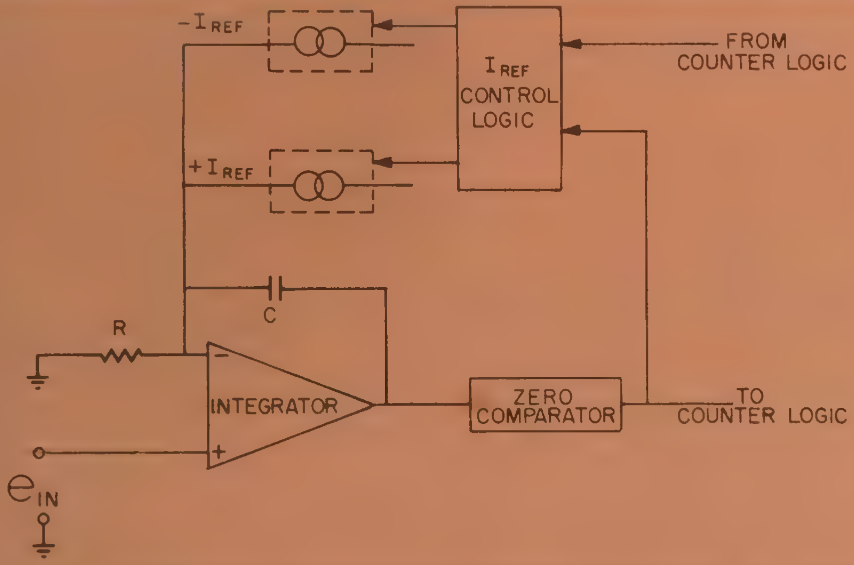
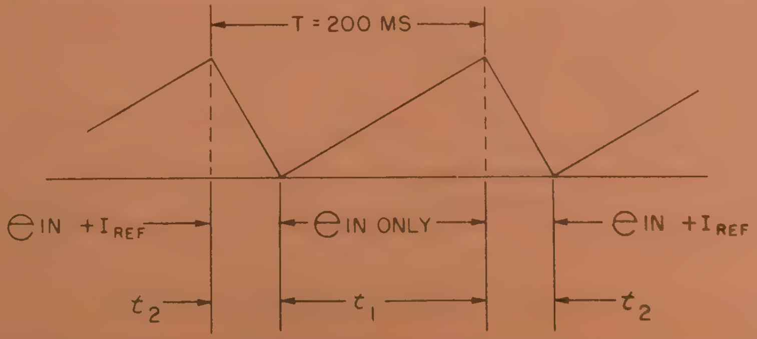
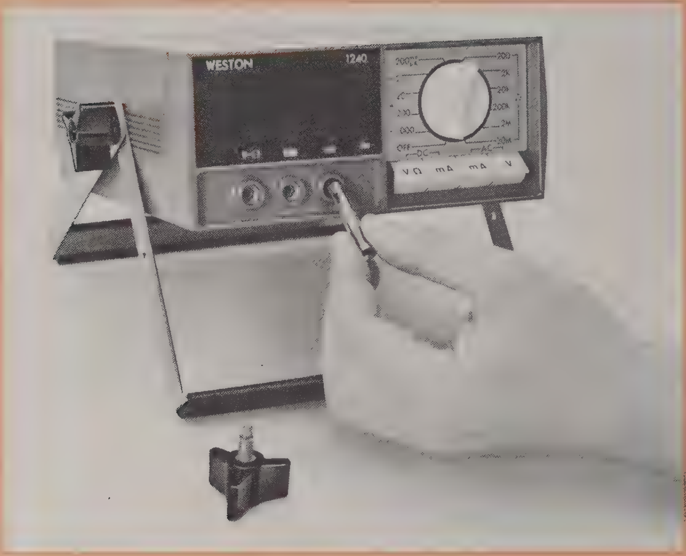


Figure 2



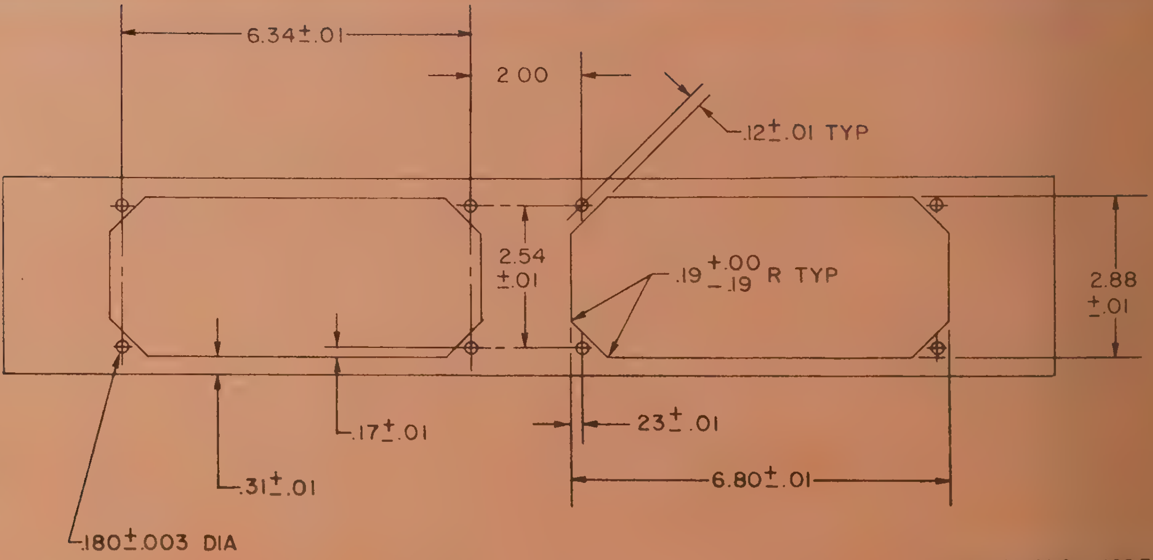
Model 1240 fuse replacement


WESTON
1240
OFF
DC
AC
V Ω
mA
mA
V

Model 1240 carried by handle

Model 1240 panel mounted

WESTON
1240
+1999
OFF
DC
AC
V Ω
mA
mA
V


6.34±.01
2 00
.12±.01 TYP
2.54
±.01
.19 +.00 −.19 R TYP
2.88
±.01
.17±.01
23±.01
.31±.01
6.80±.01
.180±.003 DIA

Panel (3.5 x 19 0 x .125 THK
MODEL 1240, 1241

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WESTON®

MODEL 1266 EVENT COUNTER

The latest addition to the Weston line of digital panel meters is a miniaturized electronic event counter. The new Model 1266 utilizes up-to-date medium scale integrated circuits mounted on a single printed circuit board. This event counter is offered in three ranges, 0 to 99, 0 to 199, and 0 to 999.

The pulse input denoting an "event" must be a positive going pulse having a low value between −2.0V and +0.45V with the high amplitude value between 1.2V and 4.0V. Pulse width is 150 nano seconds minimum with a positive going slope of 1V/microsecond minimum. These pulses are supplied from the customer's circuit which is usually a transistor switching circuit. Application assistance is available when needed.

The Model 1266 mounts completely from the front of the panel, and occupies only seven square inches of panel space. The chassis pulls out from the front for servicing. Readability and appearance is enhanced through the use of circularly polarizing window filters.

MODEL 1266 FEATURES

- **Takes only seven square inches of panel space**
- **Appearance matches Weston's digital panel meters.**
- **Model 1266 can be mounted entirely from the front of the panel.**
- **Complete chassis removable from the front of the panel.**
- **Circularly polarizing viewing window.**
- **Top rated components including Burroughs Nixies.®**

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MODEL 1266 SPECIFICATIONS

Ranges:
99
199
999

Input: Positive going pulse
High: Amplitude 1.2V to 4.0V
Width 150 nano seconds minimum
Slope 1V/micro second minimum
Low: Amplitude +0.45V to —2.0V

Reset:
Contact closure to +3.6V (supplied from the Model 1266) or positive voltage input 1.2V to 4.0V at terminal 4.

Frequency: 1 m Hz maximum

Count Input Impedance:
2K ohms in series with transistor base — emitter diode

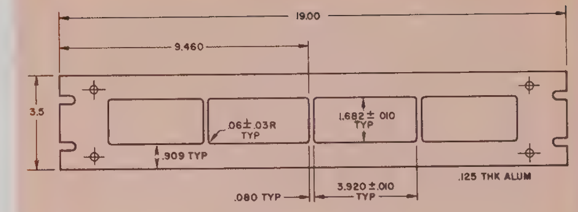
Reset Input Impedance: 300 ohms (as above)

Storage Temperature: —40°C to +70°C

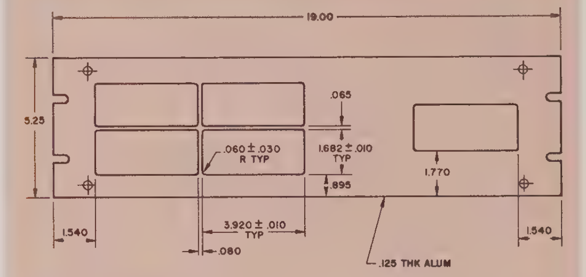
Extreme Temperature Operating Range:
5°C to 50°C

Power:
105 to 130V standard or 220V AC, 50 to 400 Hz on special order. Typically less than 5 watts.

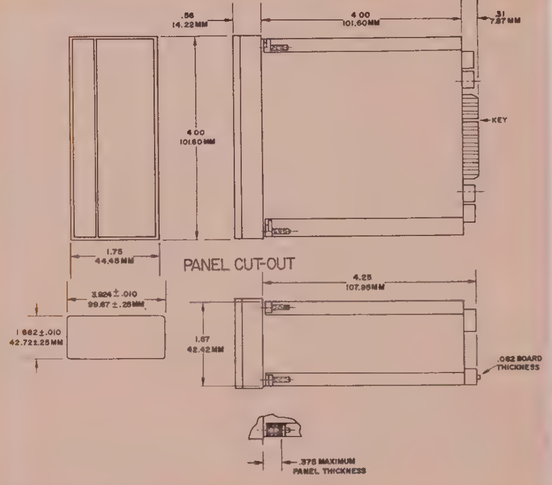
Weight: Less than 1 pound (430G)


19.00
9.460
3.5
.06±.03R TYP
1.682±.010 TYP
.909 TYP
.080 TYP
3.920±.010 TYP
.125 THK ALUM

3½ inch rack.


19.00
5.25
.065
.060±.030 R TYP
1.682±.010 TYP
.895
1.770
1.540
3.920±.010 TYP
.080
1.540
.125 THK ALUM

5¼ inch rack.


.56
14.22MM
4.00
101.60MM
.31
7.87MM
4.00
101.60MM
KEY
1.75
44.45MM
PANEL CUT-OUT
3.924±.010
99.67±.25MM
1.682±.010
42.72±.25MM
4.25
107.95MM
1.67
42.42MM
.062 BOARD THICKNESS
.375 MAXIMUM PANEL THICKNESS

Model 1266 Dimensions.

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CIRCULAR 07-108 M&J
JANUARY, 1970

WESTON®

MODEL 1266 EVENT COUNTER

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The pulse input denoting an "event" must be a positive going pulse having a low value between −2.0V and +0.45V with the high amplitude value between 1.2V and 4.0V. Pulse width is 150 nano seconds minimum with a positive going slope of 1V/microsecond minimum. These pulses are supplied from the customer's circuit which is usually a transistor switching circuit. Application assistance is available when needed.

The Model 1266 mounts completely from the front of the panel, and occupies only seven square inches of panel space. The chassis pulls out from the front for servicing. Readability and appearance is enhanced through the use of circularly polarizing window filters.

MODEL 1266 FEATURES

- **Takes only seven square inches of panel space**
- **Appearance matches Weston's digital panel meters.**
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Ranges: 99
199
999

Input: Positive going pulse
High: Amplitude 1.2V to 4.0V
Width 150 nano seconds minimum
Slope 1V/micro second minimum
Low: Amplitude +0.45V to —2.0V

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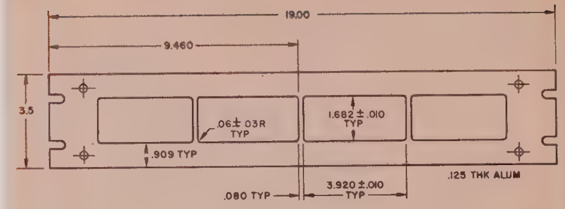
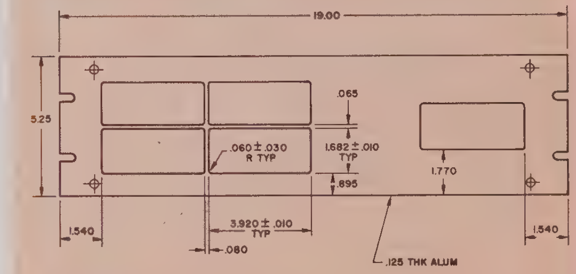

19.00
9.460
3.5
.06 ± .03R TYP
1.682 ± .010 TYP
.909 TYP
.125 THK ALUM
.080 TYP
3.920 ± .010 TYP

3½ inch rack.


19.00
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1.682 ± .010 TYP
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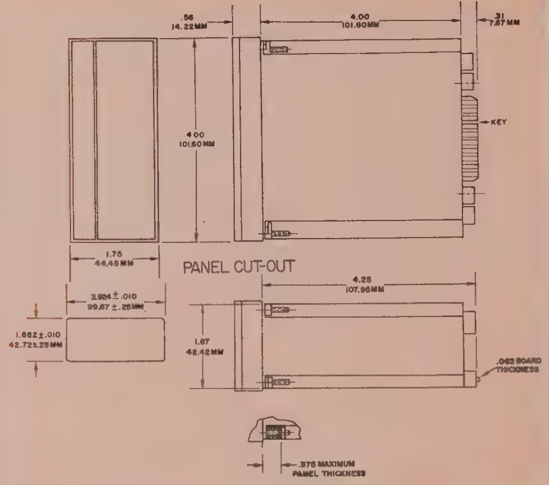
1.770
1.540
3.920 ± .010 TYP
.080
1.540
.125 THK ALUM

5¼ inch rack.


.56 14.22MM
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1.682 ± .010 42.72 ± .25MM
4.25 107.95MM
1.67 42.42MM
.062 BOARD THICKNESS
.375 MAXIMUM PANEL THICKNESS

Model 1266 Dimensions.

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CIRCULAR 07-108 M&J
JANUARY, 1970

WESTON

WESTON
MILLIVOLTS D.C.
99.9

NEW FULL PERFORMANCE ECONOMY UNIT

Model 1261 Digital Panel Meter

MODEL 1261 DIGITAL PANEL METERS

WESTON
MILLIVOLTS D.C.
99.9

The Model 1261, Weston's latest addition to its miniaturized line of digital panel meters, was specifically developed to meet the needs of the OEM market. It is designed for volume production at the lowest possible cost without compromising the superior performance associated with Weston products.

The Model 1261 is a single polarity DPM with a full scale readout of 999 with a 50% over-range capability. It includes Weston patented dual slope circuitry (Patent No. 3051939), and has an accuracy of 0.1% full scale ±1 digit with a minimum full scale range of 100 millivolts (99.9 MV) or 10 microamps (9.99 μa). Input impedance is high (50 megohms on 100 millivolt range) making it suitable for the most sensitive applications.

The complete instrument is packaged in Weston's standard miniaturized DPM housing which takes only 7 square inches of panel space (4"×1.75") with a depth behind panel of less than 4.5". This instrument far exceeds requirements of ASA C 39.1 for analog type panel meters and has been designed to operate in environments common to industrial application.

Since this is basically a digital panel meter intended to be built into the OEM's product, variations from the listed specifications are possible which will allow this unit to be taylored to your needs. These include such things as faster sampling rates, circuit adjustments allowing direct readout in engineering units thus eliminating any multiplying factors, suppressed ranges for operating from industrial transmitters, BCD output when required, and over-range capabilities.

The Model 1261 is backed by the standard Weston warranty clause.

MODEL 1261 FEATURES

- Takes only 7 square inches of panel space.
- Complete 1261 can be mounted entirely from front of panel.
- Complete chassis removal from front of panel—can be exchanged with new chassis in less than 30 seconds.
- High input impedance.
- Dual slope integration for long term stability.
- Circuit boards "Repairable"—not potted.
- Top rated components including Burroughs Nixie® tubes.
- 50% over-range standard.
- BCD available on order.

SPECIFICATIONS	**MODEL 1261**
Ranges:	
Volts	**Input Impedance**
0–100 millivolts	50 megohms
0–1 volt	500 megohms
0–10 volts	5 megohms
0–100 volts	5 megohms
0–1000 volts	5 megohms
Current:	
0–10 microamps	10 K ohms
0–100 microamps	1 K ohm
0–1 milliamp	100 ohms
0–10 milliamps	10 ohms
0–100 milliamps	1 ohm
Accuracy:	±0.1% full scale ±1 digit
Out of Range Indicator:	Blinking "1" for over-range Separate light for under-range
Over-Range:	50% (reads to 1,500)
Extreme Temperature Operating Range:	5°C to 45°C
Storage Temperature:	—40°C to 70°C
Stability:	8 hours 0.1% or less after ½ hour
Response Time:	<1 second
Readings Per Second:	5
Common Mode Rejection:	>60 DB with 1000 ohms input unbalance at 60 Hz
Normal Mode Rejection:	>30 DB at 60 Hz
Power Requirements:	117 volts±10%, 50 to 400 Hz –6 watts
Weight:	Approximately 1 lb.

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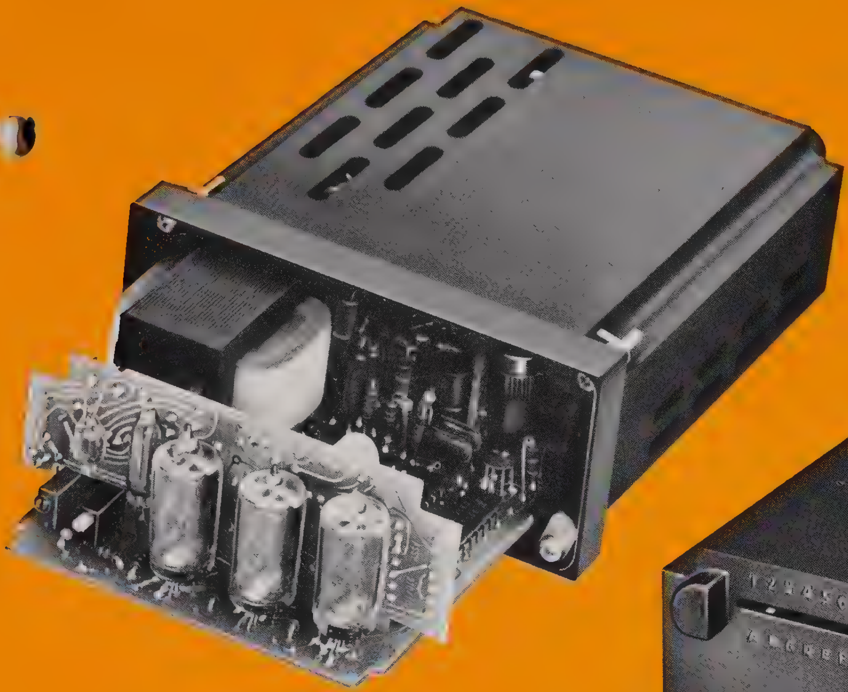
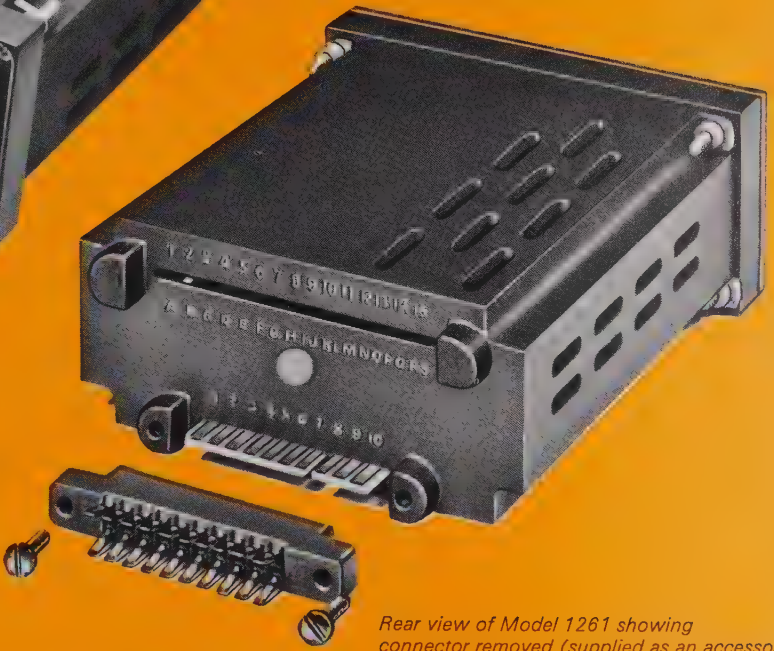
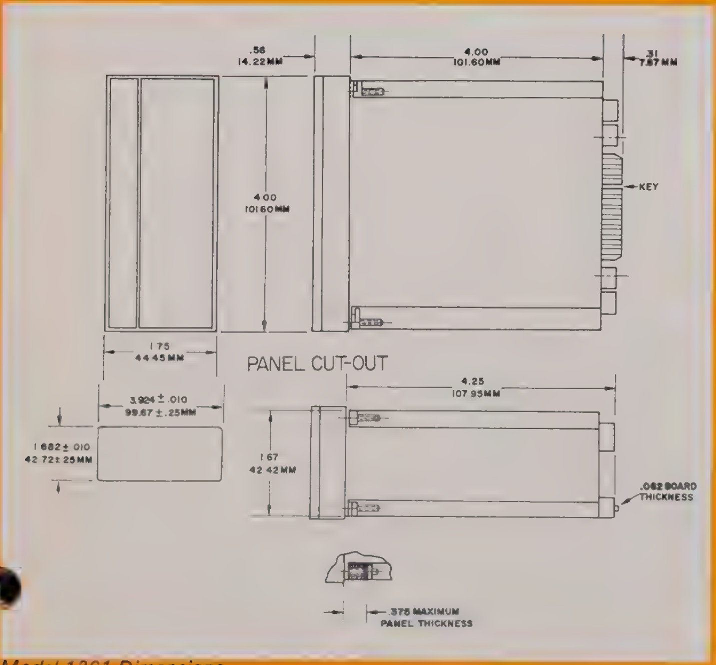
MODEL 1261



Model 1261 chassis (slid) partially out of case.



Rear view of Model 1261 showing connector removed (supplied as an accessory).


.56
14.22MM
4.00
101.60MM
.31
7.87MM
4.00
101.60MM
KEY
1.75
44.45MM
PANEL CUT-OUT
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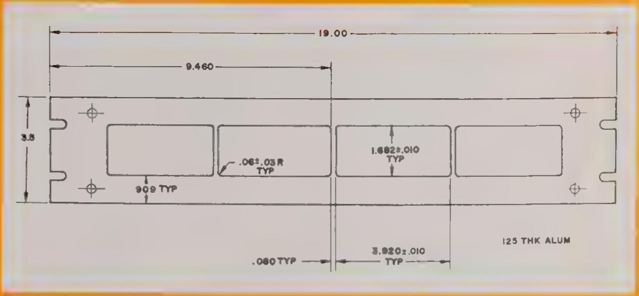
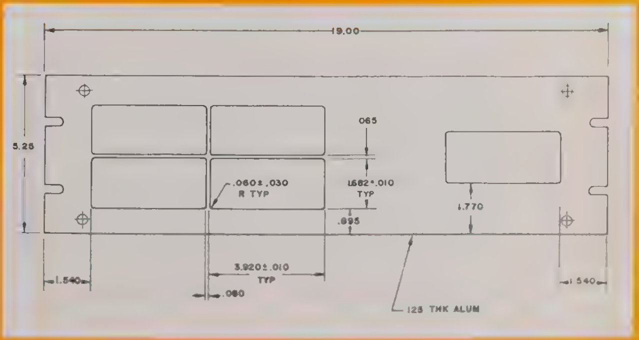
99.67 ± .25MM
1.682 ± .010
42.72 ± .25MM
4.25
107.95MM
1.67
42.42MM
.062 BOARD THICKNESS
.375 MAXIMUM PANEL THICKNESS

Model 1261 Dimensions.


19.00
9.460
3.5
.06±.03R TYP
1.682±.010 TYP
909 TYP
125 THK ALUM
.060 TYP
3.920±.010 TYP

Typical mounting arrangements in standard 19" racks.


19.00
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1.682±.010 TYP
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.895
1.540
3.920±.010 TYP
.060
1.540
125 THK ALUM

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WESTON
MILLIVOLTS D.C.
-19999
WESTON
MILLIVOLTS D.C.
-19999

Model 1294 Digital Panel Meter

MODEL 1294 DIGITAL PANEL METER

WESTON
MILLIVOLTS D.C.
-199.99

Weston's new Model 1294 Digital Panel Meter is designed for today's most stringent requirements. The Model 1294, a 4½ digit bi-polar DPM, features a display of 19999 and 10 microvolt sensitivity (on the 100 mv range). It utilizes state-of-the-art T²L logic and unique time-sharing circuitry that limits power consumption to less than six watts, making battery operation possible. Reading rate is 5 per second and response time is less than 0.7 seconds with an accuracy of 0.05% of reading ±1 digit ±10 microvolts.

Standard features of the Model 1294 DPM include high input impedance (10 megohms on the 100 millivolt range), 100% overrange capacity (19999), out-of-range indication, Weston's patented dual slope A/D conversion (U.S. Pat. #3,051,939), plug-in Nixie® tubes, repairable (non-potted) circuit boards, and ten standard voltage and current ranges. BCD output is optional.

The Model 1294 DPM occupies only 7 square inches of panel space and is housed in Weston's standard DPM case, allowing interchangeability with all other Weston DPM's. The instrument can be completely mounted and serviced from the front of the panel.

MODEL 1294 FEATURES

- 4½ digit display (19999)
- Full bi-polar operation
- High input impedance
- 100% overrange capacity (19999)
- T²L logic
- Dual Slope integration for long term stability
- Takes only 7 square inches of panel space
- Complete 1294 can be mounted entirely from front of panel
- Circuit boards "Repairable"—not potted
- Top rated components including Burroughs Nixie® tubes

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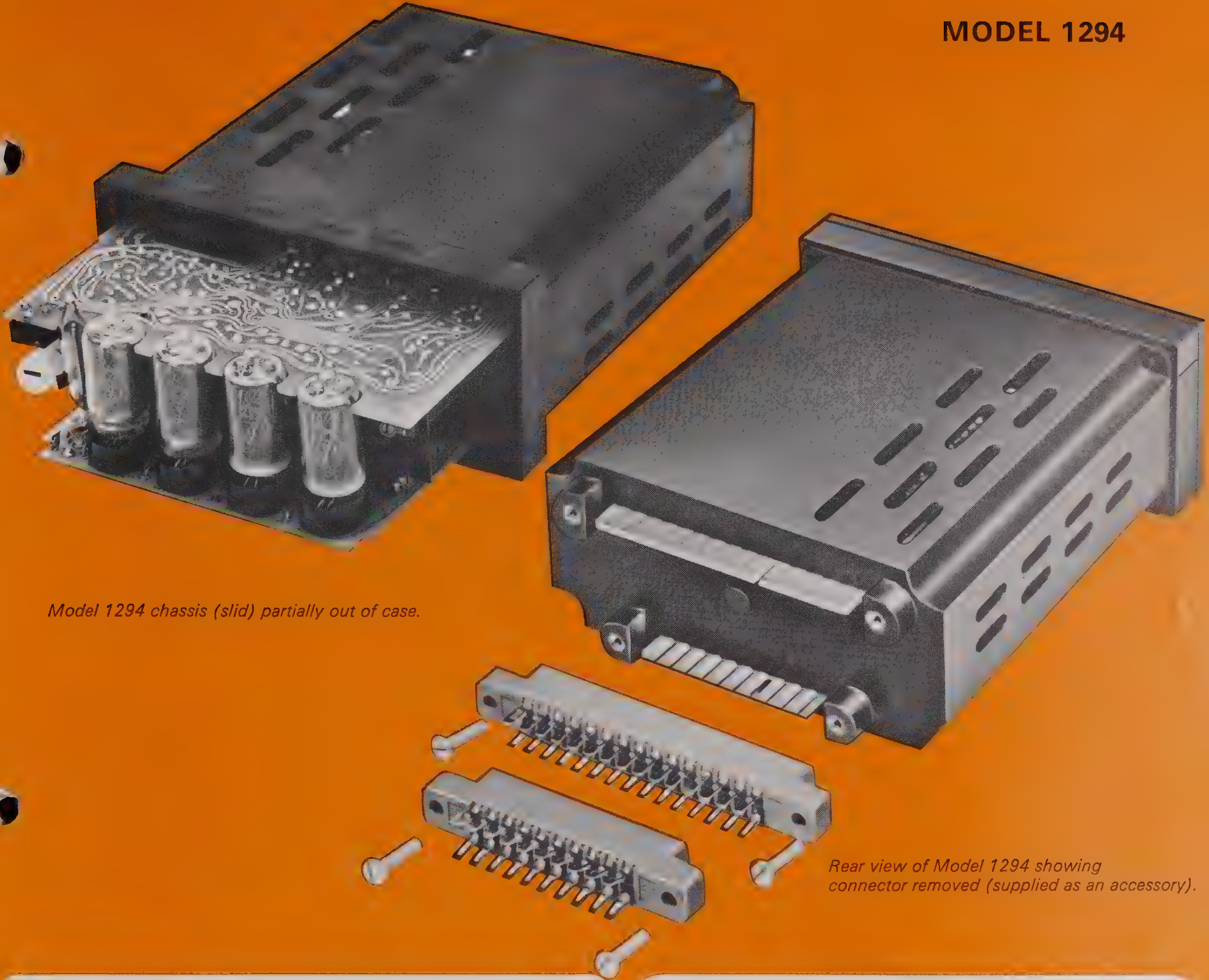
new model 1294

SPECIFICATIONS	MODEL 1294
Ranges:	
Volts:	**Input Impedance:**
0–100 millivolts	10 megohms
0–1 volt	100 megohms
0–10 volts	10 megohms
0–100 volts	10 megohms
0–1000 volts	10 megohms
Current:	**Drop:**
0–10 microamps	100 MV
0–100 microamps	100 MV
0–1 milliamp	100 MV
0–10 milliamps	100 MV
0–100 milliamps	100 MV
Accuracy:	±0.05% reading ±1 digit ±10 μV
Sensitivity:	10 microvolts (100 MV range)
Response Time:	<1.0 seconds
Resolution:	1 part in 10,000 (1 part in 20,000 in overrange)
Reading Rate:	5/second (Synchronized to line)
Temperature Coefficient:	±50 PPM of Reading ±0.2 Digit/°C
Operating Temperature:	+15°C to +35°C
Extreme Operating Temperature:	+5°C to +45°C
Storage Temperature:	—40°C to +70°C
Overrange:	100% (Reads 19999)
Common Mode Rejection:	80 DB with 1000 ohms unbalanced at 60 Hz
Normal Mode Rejection:	40 DB at 60 Hz
A/D Circuit:	Dual Slope*
Power Requirements:	117 V ±10% 50 or 60 Hz <6 watts 220 V 50 Hz (Optional)
Weight:	<2 pounds

*U.S. Pat. #3,051,939, 3,316,547

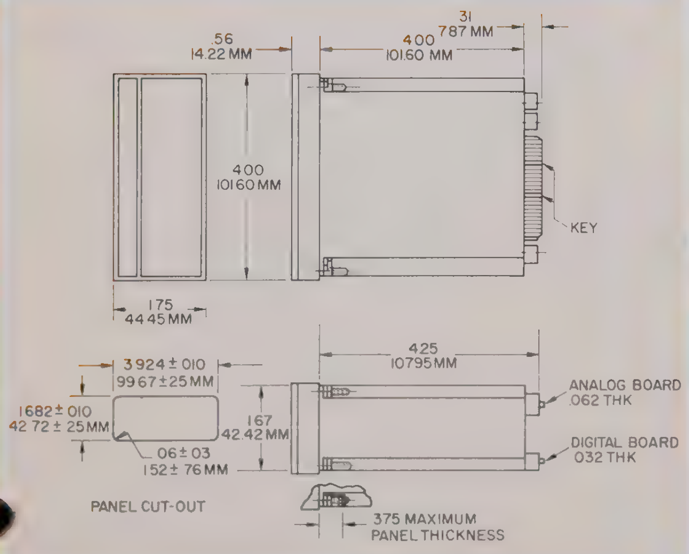
® Reg. Trade Mark Burroughs Corp.

MODEL 1294



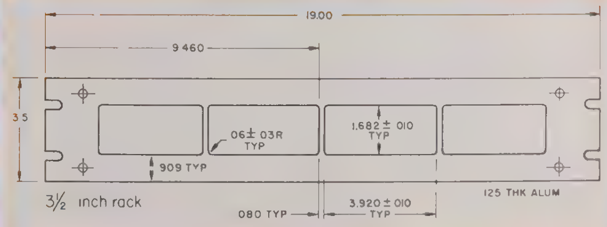
Model 1294 chassis (slid) partially out of case.

Rear view of Model 1294 showing connector removed (supplied as an accessory).



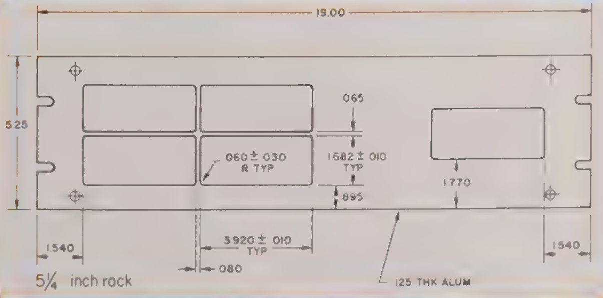
.56
14.22 MM
31
787 MM
400
101.60 MM
400
101.60 MM
KEY
175
44.45 MM
3924 ± 010
99.67 ± 25 MM
1682 ± 010
42.72 ± 25 MM
167
42.42 MM
06 ± 03
152 ± 76 MM
PANEL CUT-OUT
425
107.95 MM
ANALOG BOARD
.062 THK
DIGITAL BOARD
.032 THK
375 MAXIMUM
PANEL THICKNESS

Model 1294 Dimensions.



19.00
9 460
3.5
06 ± 03R
TYP
1.682 ± 010
TYP
909 TYP
3½ inch rack
080 TYP
3.920 ± 010
TYP
125 THK ALUM

Typical mounting arrangements in standard 19" racks.



19.00
065
5.25
060 ± 030
R TYP
1682 ± 010
TYP
1770
895
1.540
3.920 ± 010
TYP
1540
080
5¼ inch rack
125 THK ALUM

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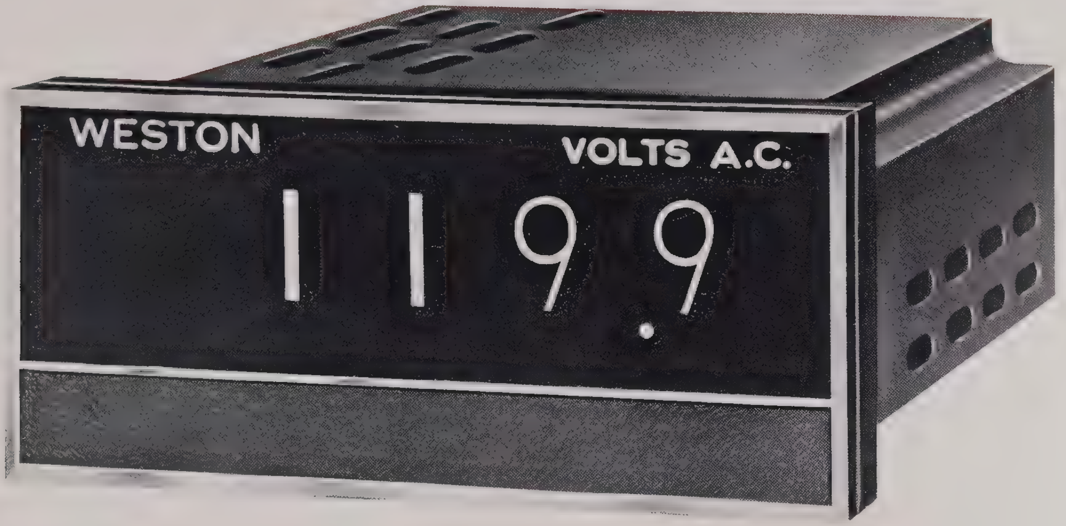
WESTON®

MODEL 1262
DIGITAL AC LINE MONITOR



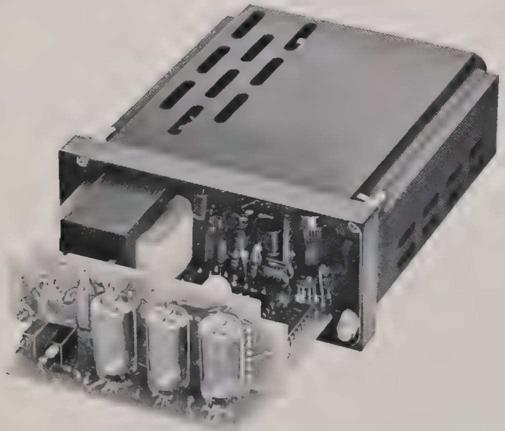
Weston Model 1262 Digital AC Line Monitor is designed for accurate measurement of AC line voltages between 100 VAC and 130 VAC. Within this voltage range the Model 1262 has a guaranteed accuracy of ±0.2 volts (2 digits) at a reference of 25°C with less than 1 digit additional error over a ±10°C ambient.

Although designed specifically for measurement of line voltages between 100 VAC and 130 VAC, the Model 1262 AC Line Monitor can be used for voltage measurements of from 0–150 volts AC with 0.1 volt resolution.

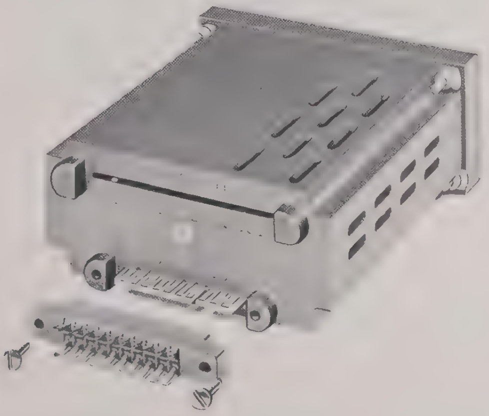
The Model 1262 is packaged in a Weston standard miniaturized DPM housing which takes only 7 square inches of panel space (4″ x 1.75″) with a depth behind the panel of less than 4.5″. The entire chassis pulls out from the front for servicing operations.

Special features of the Model 1262 include dual-slope integration (Weston Patent 3,051,939), circularly polarizing viewing window, BCD output (optional), repairable (not potted) circuit boards, and top-rated components including Burroughs Nixie® tubes.

® Reg. Trademark Burroughs Corp.



Model 1262 chassis (slid) partially out of case.



Rear view of Model 1262 showing connector removed (supplied as an accessory).

MODEL 1262 FEATURES

- Guaranteed accuracy of 0.2 volts.
- Direct visual readout of AC line voltage.
- Top-rated components including Burroughs Nixie® Tubes.
- Takes only 7 square inches of panel space.
- Complete 1262 can be mounted entirely from front of panel.
- Complete chassis removal from front of panel—can be exchanged with new chassis in less than 30 seconds.
- Dual slope integration for long term stability.
- Circuit boards "Repairable"—not potted.

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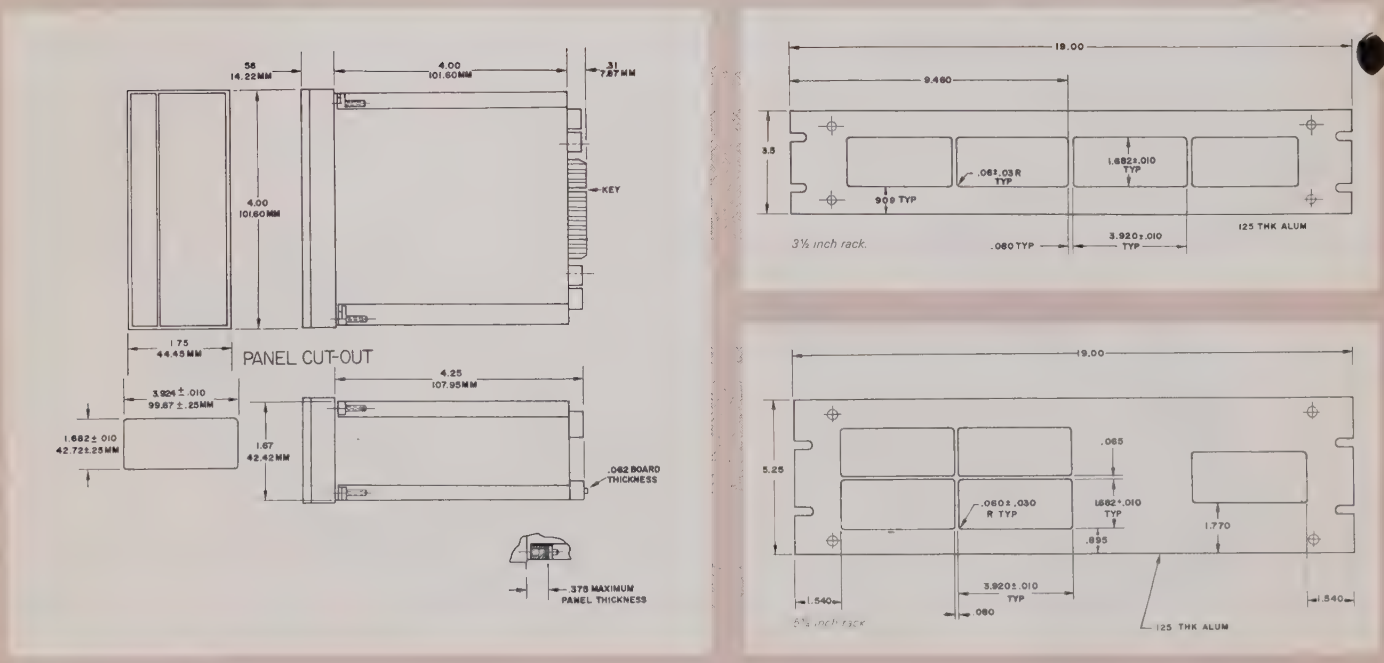
MODEL 1262 AC LINE MONITOR SPECIFICATIONS

- **Range:** 100-130 volts AC (usable from 0-150 volts AC)
- **Accuracy:** 0.2% reading ± 1 digit
- **Temperature Coefficient:** 0.007% reading/°C
- **Input Impedance (60Hz):** approximately 300K OHMS
- **Reading Speed:** 5/second
- **Response Time:** <2 Seconds
- **Maximum Overload:** 240 volts RMS
- **Power Requirements:** 117V, 50-60Hz, approximately 6.25 watts
- **Operating Temperature:** 12°C to 40°C
- **Extreme Operating Range:** 5°C to 45°C
- **Storage Temperature:** –40°C to +70°C
- **BCD Output:** available as an option
- **Breakdown Voltage:** 500 volts RMS (shield to either line or low side of input)
- **Weight:** less than 1 pound


.56
14.22MM
4.00
101.60MM
.31
7.87MM
KEY
4.00
101.60MM
1.75
44.45MM
PANEL CUT-OUT
4.25
107.95MM
3.924 ± .010
99.67 ± .25MM
1.682 ± .010
42.72 ± .25MM
1.67
42.42MM
.062 BOARD THICKNESS
.375 MAXIMUM PANEL THICKNESS
19.00
9.460
3.5
.06 ± .03 R TYP
1.682 ± .010 TYP
.909 TYP
3½ inch rack.
.080 TYP
3.920 ± .010 TYP
125 THK ALUM
19.00
5.25
.065
.060 ± .030 R TYP
1.682 ± .010 TYP
.895
1.770
1.540
3.920 ± .010 TYP
.080
1.540
5¼ inch rack
125 THK ALUM

Model 1262 Dimensions.

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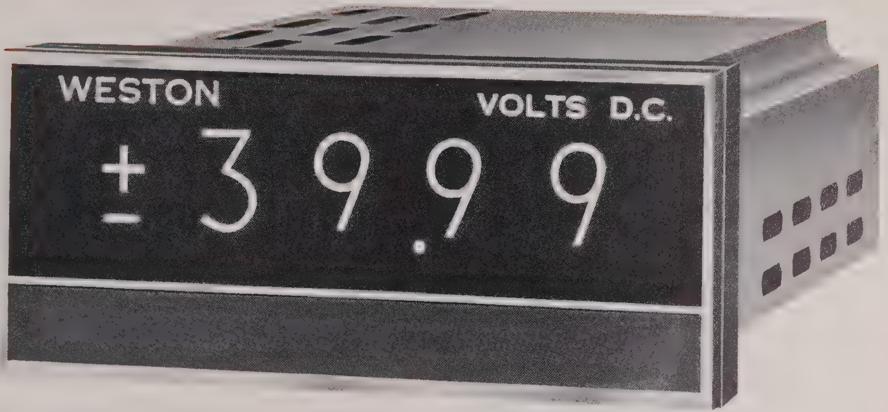
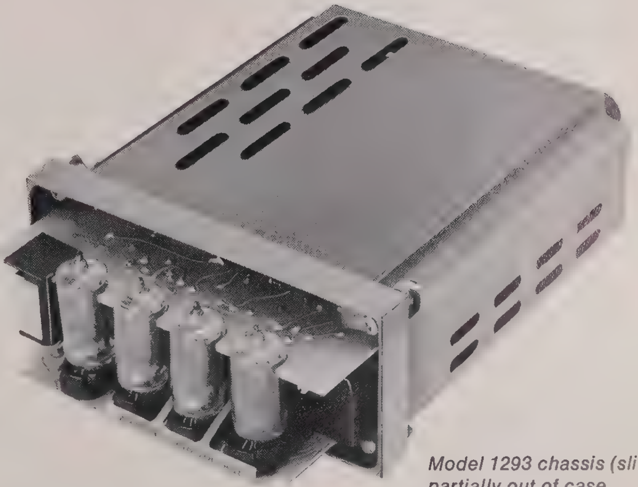
MODEL 1293 BI-POLAR DIGITAL PANEL METER



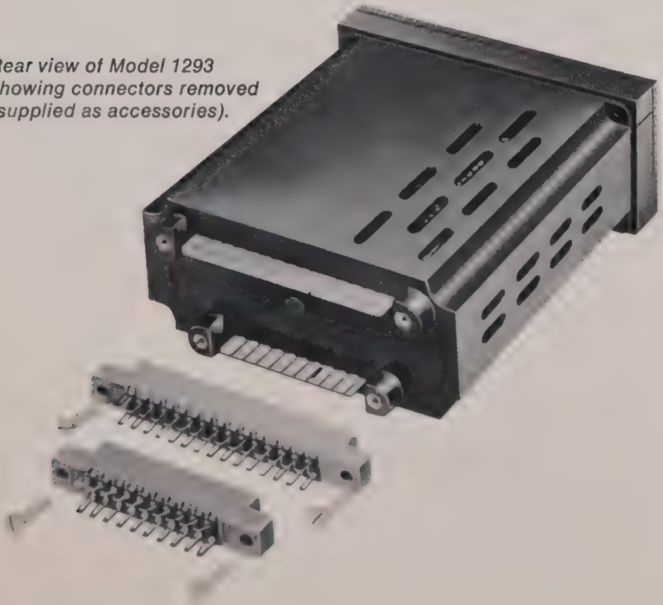
The Weston Model 1293 Digital Panel Meter is a miniature single range, Bi-Polar, high input impedance instrument designed to indicate input DC voltage or current in one of eleven possible ranges. Full scale is 4000 digits with a readout of ± 3999. The Model 1293 is equipped with automatic out-range indication (the 4000 "4" blinks above the full scale reading) and polarity indicators. Other important features include extremely high input impedance (100 megohms on the 100-millivolt range, 1000 megohms on the 1-volt range, and 10 megohms on all other ranges), dual slope integration (Weston patent 3,051,939), and separate references for both end points of the range, thus making the zero point independent of end scale adjustments. This feature makes it easier to adjust end scale points and provides greater stability at zero input.

Available in voltage ranges from 400 millivolts to 1,000 volts and in current ranges from 4 microamps to 400 milliamps, the Model 1293 DPM features include 0.1% full scale ± 1 digit accuracy (15°C to 35°C) with a minimum full scale range of 4 microamps (3.999) or 400 millivolts (399.9), 1-2-4-8 BCD output, full storage display, decimal points brought to rear terminals for external programming, sampling rates tied to phased-locked fundamentals of 60 Hz for excellent noise rejection characteristics, and a circularly polarized filter window to eliminate glare.

The complete instrument is packaged in a Weston standard miniaturized DPM housing which takes only 7 square inches of panel space (4″ x 1.75″). The Model 1293 is designed for broad industrial and medical OEM applications, such as temperature indications up to 4000 degrees F or C.



Model 1293 chassis (slid) partially out of case.



Rear view of Model 1293 showing connectors removed (supplied as accessories).

MODEL 1293 FEATURES

- **Dual slope integration for long term stability.**
- **Automatic out range and polarity indicators.**
- **Extremely high input impedance.**
- **BCD output.**
- **Decimal points brought to rear terminals for external programming.**
- **Separate references for both end points of the range to provide greater stability at zero input.**
- **Takes only 7 square inches of panel space.**
- **Complete 1293 can be mounted from front of panel.**
- **Top-rated components including Burroughs Nixie® Tubes.**
- **Circuit boards "repairable"—not potted.**

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MODEL 1293 SPECIFICATIONS

Ranges:

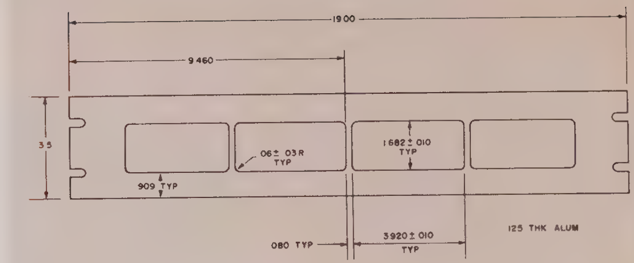
Volts	Input Impedance
0-400 millivolts	100 meg
0-4 volts	1000 meg
0-40 volts	10 meg
0-400 volts	10 meg
0-1000 volts	10 meg

Current:

0-4 microamps	100K ohms
0-40 microamps	10K ohms
0-400 microamps	1K ohms
0-4 milliamps	100 ohms
0-40 milliamps	10 ohms
0-400 milliamps	1 ohm

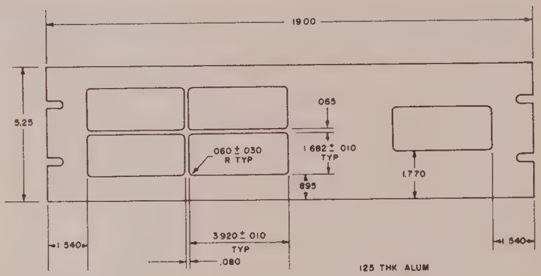
Minimum Range	00.0 to 400.0 Millivolts D.C .
Out Range Indication	Above 4000—Blink
Rated Accuracy	± 0.1% of Full Scale ± 1 digit
Input Resistance	100 Meg Ohms
Common Mode Rejection Ratio	80 DB with 1000 ohms unbalance at 60 Hz
Normal Mode Rejection Ratio	35 DB at 60 Hz
Speed	0.20 seconds per reading
Response Time	3.0 seconds
Max. Voltage Overload	60 Volts D.C.
Stability	± 0.1% Full Scale
Power	117 Volt Nominal, (105 to 129) 60 Hz 8 watts*
Weight	1 lb. 4 oz.
Operating Temperature	15°C to 35°C
Extreme Operating Range	5°C to 45°C
Storage Temperature	—40°C to 70°C

**The Model 1293 is available as a 50 Hz unit, 115V or 230V.*

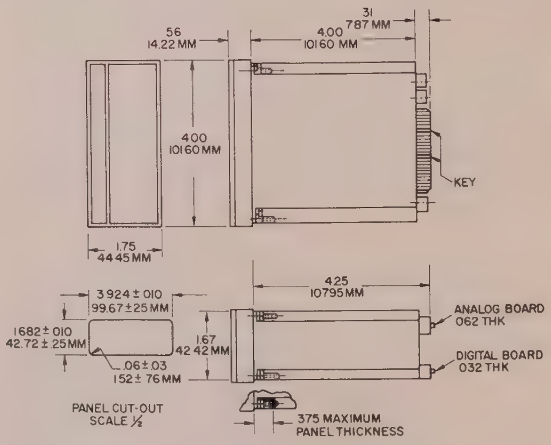

19 00
9 460
3 5
06± 03 R TYP
1 682 ± 010 TYP
909 TYP
080 TYP
3 920 ± 010 TYP
125 THK ALUM

3½ inch rack.

Typical mounting arrangements in standard 19" racks.


19 00
5.25
065
060 ± 030 R TYP
1 682 ± 010 TYP
895
1.770
1 540
3 920 ± 010 TYP
.080
125 THK ALUM
1 540

5½ inch rack.


31
787 MM
56
14.22 MM
4.00
101 60 MM
4 00
101 60 MM
KEY
1.75
44 45 MM
4 25
107 95 MM
3 924 ± 010
99.67 ± 25 MM
1682 ± 010
42.72 ± 25 MM
1.67
42 42 MM
.06 ± 03
152 ± 76 MM
ANALOG BOARD
062 THK
DIGITAL BOARD
032 THK
PANEL CUT-OUT
SCALE ½
375 MAXIMUM
PANEL THICKNESS

Model 1293 Dimensions

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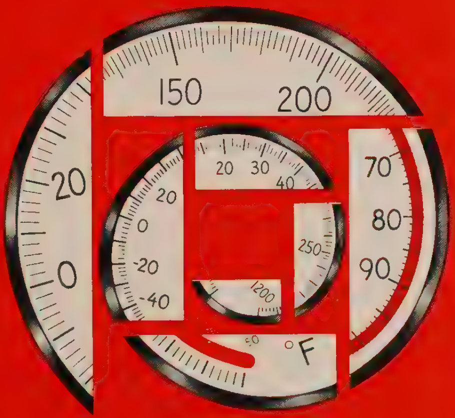
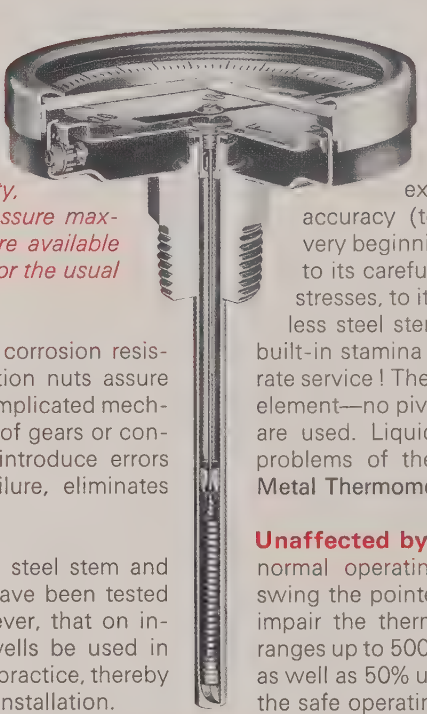

150
200
20
0
70
80
90
20
30
40
20
0
-20
-40
250
200
°F

Bimetal Thermometers

FEATURES: Rugged construction / Externally calibrated / Easy to read "in-line" scales and pointers / Corrosion resistant stainless steel / Unaffected by over and under temperature / Accuracy from 1/2% to 1% / Sealed against moisture / Removable bezel / Rapid response time /

ADVANTAGES



SECTIONAL VIEW OF A WESTON BI-METAL THERMOMETER

The thermometers listed in this catalog have been designed to provide accurate and dependable temperature measurements for industrial and laboratory applications. Their rugged all-metal construction, exceptional readability, and proved reliability all combine to assure maximum service. Weston thermometers are available in a variety of ranges, sizes, and types for the usual industrial and laboratory applications.

Rugged: All-metal construction with corrosion resistant stainless steel stems and connection nuts assure long, dependable service. No pivots, complicated mechanisms or parts, are used. The absence of gears or connection links, factors which tend to introduce errors and frequently result in complete failure, eliminates wear and friction.

Pressure Tested: The 18-8 stainless steel stem and connection nut on industrial models have been tested at 1000 psi. It is recommended, however, that on installations involving high pressures, wells be used in accordance with standard thermometer practice, thereby providing additional insurance to the installation.

Easy to Install: Thermometer connection nuts have National Pipe Threads. Easily mounted at any angle for convenience in reading.

Easy to Read: The circular dial and pointer method of measuring temperature permits the use of easily read, widely spaced scale markings.

Sensitive Element: The heart of Weston All Metal Thermometers is the helix sensing element. The Weston helix is more than just the "run of the mill" sensing element, for Weston's exclusive fabrication assures long-term accuracy (to ± ½% of the entire scale). From the very beginning of the formation of the bimetal helix, to its careful sizing and aging to eliminate inherent stresses, to its shock mounted inclusion in the stainless steel stem, every Weston Thermometer has the built-in stamina to give years of dependable and accurate service! The pointer is driven directly by the sensing element—no pivots or complicated linkage mechanisms are used. Liquid column separation and leakage are problems of the past when you specify **Weston All Metal Thermometers.**

Unaffected by over or under Temperatures: Abnormal operating conditions which may temporarily swing the pointer beyond the end of the scale will not impair the thermometer accuracy. 50% overswing on ranges up to 500 F and 10% for ranges of 500 F to 750 F, as well as 50% underswing on all ranges are well within the safe operating limits of the bi-metal element.

Reliable: The bi-metal principle of temperature measurement eliminates the need for gases, liquids, or capillary connections. Since Weston thermometers are of all-metal construction, breakage and maintenance are materially reduced.

Calibration: All thermometers are calibrated with standards directly traceable to the National Bureau of Standards.

EVERY SALES-SERVICENTER BACKS UP THE WESTON WARRANTY!

Weston products are warranted to be of good workmanship and quality and free from defects. Our liability is limited to repairing or replacing the instrument or any part thereof (except tubes, batteries or lamps), if our examination shall disclose it to have been defective under proper and normal use, provided it is returned prepaid to the Service Division of Weston Instruments, Inc., Weston-Newark Division, 614 Frelinghuysen Ave., Newark, N. J. 07114, within one year after the date of purchase. We shall not be liable for consequential damages of any kind. This warranty is in lieu of all other warranties, liabilities, or obligations, statutory or implied, to the original purchaser or to any other person.

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GENERAL INFORMATION

Weston Thermometers are equipped with 18-8 Type 304 stainless steel stems, which are corrosion resistant and will withstand pressures encountered in practically all industrial applications. However, where the safety requirements in a specific service demand it, or where abrasion or corrosion are important factors, Weston Wells should be used. They can be supplied for most Weston Thermometers, and facilitate removal in many applications. A complete line of mounting accessories is illustrated on pages 14 and 15.

Thermometer stems over 36″ long are supplied with a heavy walled stem of .375″ outside diameter. A long stem may require support as a protection against bending. In some cases, this can be accomplished in the mounting of the instrument. *Prices for long stem thermometers on application.*

Special Applications: The thermometers covered by this catalog have standard ranges and stem lengths. If your application involves other than standard thermometers, odd size connection nuts, ranges, specially marked or calibrated scale plates, odd stem lengths, special fabricating materials, finishing and special waterproofing—please feel free to write regarding your requirements, or communicate with the nearest Weston Representative or District Office, located in principal cities.

SpecialWindows: All Weston Thermometers can be supplied with special, clear, unbreakable plastic windows in lieu of the standard glass, at a surcharge. This new plastic withstands scratches very satisfactorily and will not discolor. Since the window material is usually the coolest part of the thermometer while in use, the temperature of the face, rather than of the stem, should determine whether plastic windows should be specified. Plastic scale windows will withstand temperature up to 150 F.

Corrosive Conditions: Where corrosive conditions indicate the use of special materials in wells, correspondence is necessary. Information should contain the corrosive medium and temperatures involved. It would also be helpful to know what other materials are at present being used in contact with this corrosive medium, such as the tank lining, pipes and valves and whether or not an electric current is present.

Many corrosive conditions can be overcome by coating the thermometer stem or well with a suitable lead or plastic coating. In order to provide the proper coating, complete details as listed above are necessary. Price will depend upon the material used and the stem length.

Well and Stem Dimensions: The minimum stem length of Weston wells is 3½″ (this dimension includes the external threads). This well fits a Weston Thermometer having a stem length of 4″. For other well dimensions refer to pages 14 and 15.
Stem length dimensions of Weston Thermometers, as well as wells, always include the external threads.

High Pressure or Heavy Duty Wells: Wells are available for high pressure or heavy duty installations in any type of service. These wells are of thick, stainless steel construction. Prices on application.

ORDERING INFORMATION

When correctly selected, Weston Thermometers will give many years of dependable, accurate service; therefore, it is important that your purchase orders contain the following information:

1 Model number.

2 Range desired.

3 Stem length required.

4 Connection nut size if not Standard.

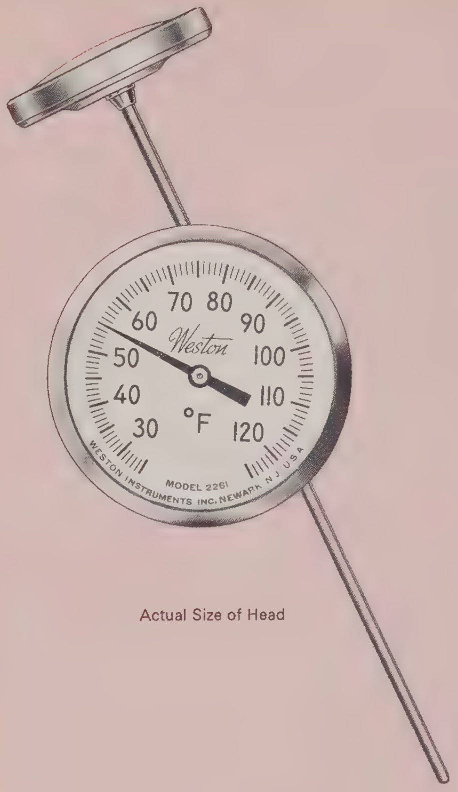
5 Accessories required. (State part number.)

6 If your particular application involves the use of other than standard Weston Thermometers or Accessories to be employed under other than normal operating conditions, please supply details.

7 If head is to be subjected to temperatures in excess of 300 F, state temperature.

TESTING THERMOMETER

MODEL 2261



Actual Size of Head

General: This thermometer, except for the scale glass, is completely encased in stainless steel, which is corrosion resistant to most acids and gases. For protection against corrosives that attack stainless steel, see page 3.

Head: 1¾″ diameter, 18-8 stainless steel case and bezel. Metal scale plate with permanent black figures and markings. Pointer and scale designed for easy reading. Glass window is standard (See page 3 for plastic windows). If head is to be subjected to temperatures in excess of 300 F, state temperature when ordering.

Scale Length: 3.40 inches.

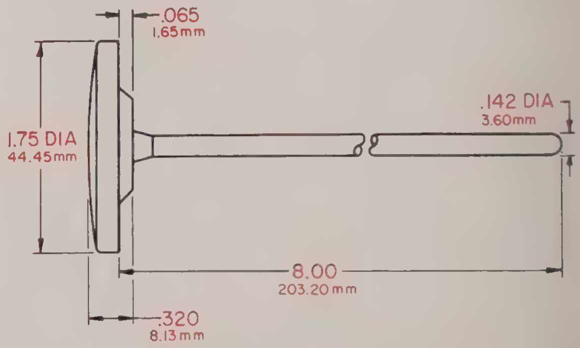
Stem: 18-8 Type 304 stainless steel, .142″ diameter. Standard stem length is 8″ including hub; other stem lengths up to 12″ in ½″ increments and from 12″ to 24″ in 1″ increments available on special order. Stems from 12″ to 24″ long are .162″ diameter.

Immersion: For correct temperature indications, immerse at least 2″ in liquids and 4″ in gases.

Accuracy: Within ½ of 1% of the thermometer range (1 F per 200 F or ½ C per 100 C).

RANGE	°/DIV.	RANGE	°/DIV.	RANGE	°/DIV.
–100 to 100 F	2	50 to 300 F	2	–10 to 110 C	2
25 to 125 F	1	50 to 400 F	5		
–40 to 160 F	2	50 to 500 F	5	0 to 100 C	1
0 to 180 F	2			0 to 150 C	2
		–100 to 40 C	2	0 to 250 C	2
0 to 220 F	2	0 to 50 C	½		
50 to 250 F	2	–50 to 100 C	2		

Approximate Weight . . . . .1 oz.



All Dimensions are Approximate.

Spike Stem Thermometer—

The addition of a spike stem makes the Model 2261 an ideal meat or food testing thermometer.

Can also be supplied for internal oven use where the entire thermometer would be used at continuous high temperatures. Available in following ranges.

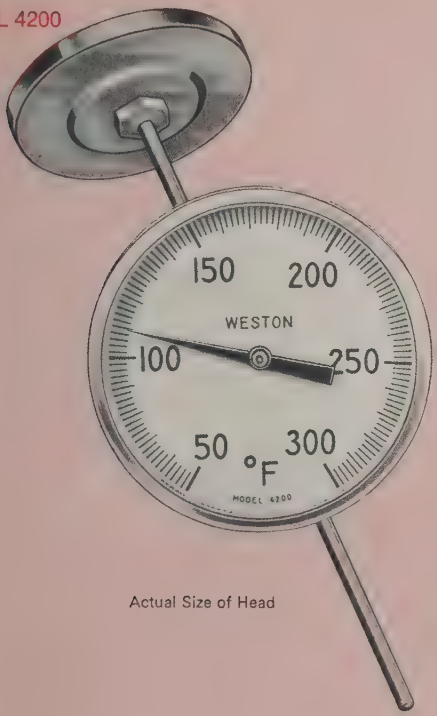
RANGES	STEM LENGTHS	RANGES	STEM LENGTHS
–40 to 160 F	5″ or 8″	0 to 220 F	5″ or 8″
0 to 180 F	5″ or 8″	25 to 125 F	5″

Approximate Weight . . . . .1 oz.

LABORATORY THERMOMETER

WITH EXTERNAL ADJUSTMENT

MODEL 4200



Actual Size of Head

General: This thermometer, except for the scale glass, is completely encased in stainless steel, which is corrosion resistant to most acids and gases. For protection against corrosives that attack stainless steel, see page 3.

The thermometer can be recalibrated without disassembly by firmly holding the head and immersing the stem at least 2″ in an agitated known controlled temperature bath and turning the hex nut until the pointer indicates the correct temperature.

Head: 2″ diameter, 18-8 stainless steel case and bezel. Metal scale plate with permanent black figures and markings. Pointer and scale designed for easy reading. Glass window is standard. Head should not be subjected to temperatures in excess of 300 F.

Scale Length: 4½″.

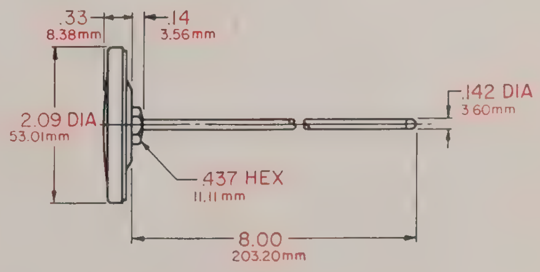
Stem: 18-8 Type 304 stainless steel, .142″ diameter. Standard stem length is 8″ including external adjustment nut.

Immersion: For correct temperature indications, immerse at least 2″ in liquids and 4″ in gases.

Accuracy: Within ½ of 1% of the thermometer range.

RANGE	°/DIV	RANGE	°/DIV.	RANGE	°/DIV.
–100 to 100 F	2	50 to 300 F	2	–10 to 110 C	1
25 to 125 F	1	50 to 400 F	5		
–40 to 160 F	2	50 to 500 F	5	0 to 100 C	1
0 to 180 F	2			0 to 150 C	2
		–100 to 40 C	2	0 to 250 C	5
0 to 220 F	2	0 to 50 C	½		
50 to 250 F	2	–50 to 100 C	2		

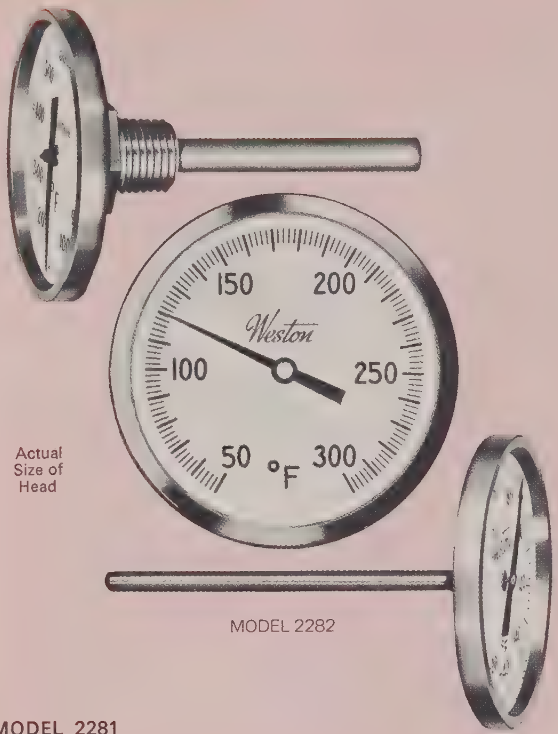
Approximate Weight. . . . . .1 oz.



All Dimensions are Approximate.

GENERAL PURPOSE THERMOMETERS

MODELS 2281 AND 2282



MODEL 2281

RANGE	°/DIV.	RANGE	°/DIV.	RANGE	°/DIV.
−100 to 100 F	2	50 to 500 F	5	−10 to 110 C	1
−40 to 120 F	2	150 to 750 F	10		
25 to 125 F	1	200 to 1000 F*	10	0 to 150 C	2
0 to 200 F	2			0 to 200 C	2
20 to 240 F	2	−100 to 50 C	2	0 to 300 C	5
		0 to 50 C	½	100 to 400 C	5
50 to 300 F	2	−50 to 100 C	2		
50 to 400 F	5	0 to 100 C	1		

*Not recommended for continuous operation above 800 F.

MODEL 2282

RANGE	°/DIV.	RANGE	°/DIV.	RANGE	°/DIV.
−100 to 100 F	2	50 to 300 F	2	−10 to 110 C	1
25 to 125 F	1	50 to 400 F	5	0 to 100 C	1
−40 to 160 F	2	50 to 500 F	5		
0 to 180 F	2			0 to 150 C	2
0 to 220 F		−100 to 40 C	2	0 to 250 C	5
	2	0 to 50 C	½		
50 to 250 F	2	−50 to 100 C	2		

Model 2282—Scale Calibrated in Both °C. and °F.

For use in exploring unknown temperatures with less danger of overscaling. Stem Length 8″.

	with .142″ diam. stem	°/DIV		*with .25″ diam. stem*	°/DIV.
Range	−100 to 260 C	10	Range	−100 to 540 C	10
	−150 to 500 F	10		−150 to 1000 F	10

Approximate Weights

Model 2281, 2½″ to 12″ stem—Model 2282, 8″ stem……2 oz.

General: The overall design of these thermometers makes them particularly adaptable for either testing or general industrial use where small size is important. Model 2281 is the industrial version, regularly equipped with 18-8 stainless steel, ¼″ diameter stem and threaded ¼″ National Pipe Thread connection nut. (Can be supplied with ⅜″ or ½″ N.P.T. connection nut at a surcharge.)

For general test purposes Model 2282 is recommended and is regularly supplied with 18-8 stainless steel, .142″ diameter stem, without connection nut.

Head: 2″ diameter, 18-8 stainless steel case and bezel. Metal scale plate with permanent black figures and markings. Pointer and scale designed for easy reading. Glass window is standard (See page 3 for plastic windows). If head is to be subjected to temperatures in excess of 300 F, state temperature when ordering.

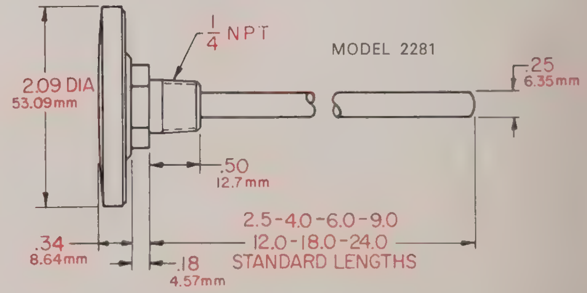
Scale Length: 4½″.

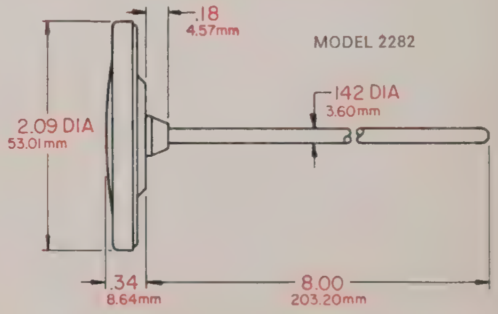
Stem: Model 2281, 18-8 Type 304 stainless steel, .25″ diameter. Standard lengths are 2½″, 4″, 6″, 9″, 12″, 18″ and 24″, including threads. Can be supplied with intermediate stem lengths up to 12″ in ½″ increments and from 12″ to 36″ in 1″ increments on special order.

Model 2282, 18-8 Type 304 stainless steel, .142″ diameter. Standard length 8″ including hub. Can be supplied in other stem lengths up to 12″ in ½″ increments and from 12″ to 24″ in 1″ increments available on special order. Stems from 12″ to 24″ long are .162″ diameter.

Immersion: For correct temperature indications, the stem should be immersed at least 2″ in liquids and 4″ in gases.

Accuracy: Within 1% for Model 2281 and ½% for Model 2282 of range over entire scale.

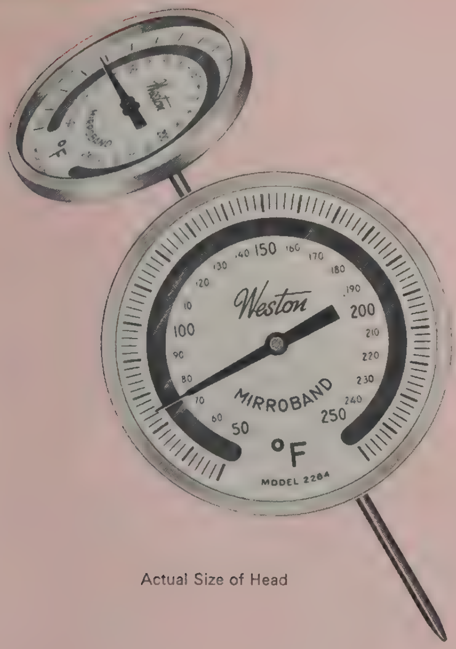




All Dimensions are Approximate.

MIRROBAND® PRECISION TESTING THERMOMETER

MODEL 2284



Actual Size of Head

General: The overall design of these rugged all-metal thermometers makes them particularly useful for precise temperature measurement. A mirror scale and a knife-edge pointer are incorporated to eliminate parallax error. Except for the scale glass, this thermometer is completely encased in welded stainless steel which is corrosion resistant to most common acids and gases.

Head: 2″ diameter, metal scale plate with white background and black figures and markings. Glass window is standard. If head is to be subjected to temperatures in excess of 250°F, state temperature when ordering.

Scale Length: 4½″

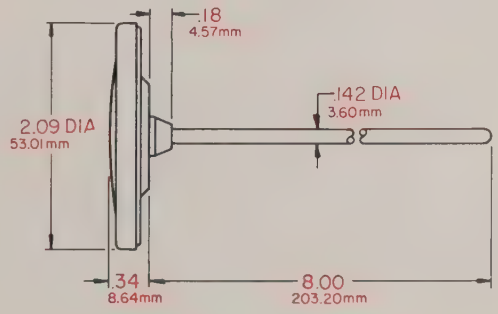
Stem: 18-8 type 304 stainless steel, .142″ diameter. Standard length is 8″.

Immersion: For correct temperature indications, the stem should be immersed at least 2″ in liquids, 4″ in gases.

Accuracy: Within ½% of range over the entire scale.

RANGE	°/DIV.	RANGE	°/DIV.	RANGE	°/DIV.
25 to 125 F	1	50 to 250 F	2	–10 to 110 C	1
–20 to 100 F	1	50 to 500 F	5	0 to 250 C	5
0 to 220 F	2				

Approximate Weight . . . . 1 oz.

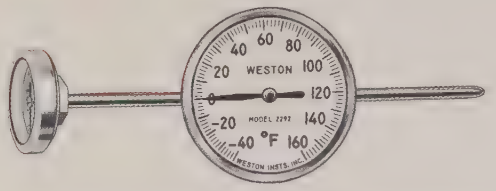


All Dimensions are Approximate.

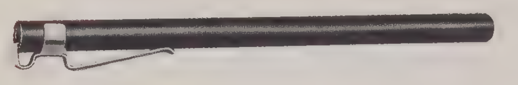
POCKET THERMOMETER

WITH EXTERNAL ADJUSTMENT –

MODEL 2292



Actual Size of Head



General: Ideal for spot checking by inspectors, foremen, operators in various industries such as heating, ventilating, chemical and oil. Supplied with a hard rubber carrying case with an attached pocket clip.

The thermometer can be recalibrated without disassembly by firmly holding the head and immersing the stem at least 2″ in an agitated known controlled temperature bath and turning the hex nut until the pointer indicates the correct temperature.

Head: 1″ diameter, 18-8 stainless steel, case and bezel. Plastic window is standard. If head temperature exceeds 220 F a glass window can be supplied at a surcharge. Metal scale plate with permanent black figures and markings.

Scale Length: 2.1 inches.

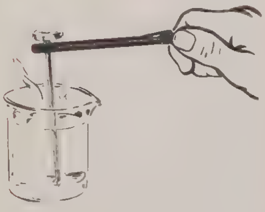
Stem: 5″ spiked, (For easy insertion into meat, food packages or any semi-solid materials) 18-8 Type 304 stainless steel, .142″ diameter.

Immersion: For correct indications the stem should be immersed at least 2″ in liquids and 4″ in gases.

Accuracy: Within ½% of range over entire scale.

RANGE	°/DIV.	RANGE	°/DIV.	RANGE	°/DIV.
–40 to 160 F	2	0 to 220 F	2	0 to 150 C	2
25 to 125 F	1	50 to 500 F	5	0 to 250 C	5

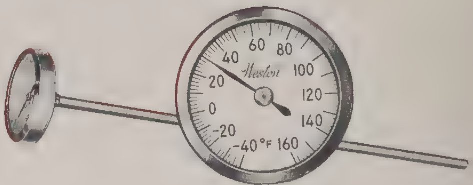
Approximate Weight . . . . 1 oz.



Note a small loop on the clip at the end of the black pocket case provided with the thermometer. By inserting the stem through the loop, the case becomes a convenient handle for immersing the thermometer in liquids and avoids possible burns or loss of thermometer.

MIDGET THERMOMETER

MODEL 2291



Actual Size of Head

General: Where space is limited, this custom fabricated compact thermometer is ideal for fastening to equipment by means of its ¼-28x¼″ long threaded hub, located at the stem-case junction.

Head: 1″ diameter, 18-8 stainless steel, case and bezel. Plastic window is standard. If head temperature exceeds 220 F a glass window can be supplied at a surcharge. Metal scale plate with permanent black figures and markings.

Scale Length: 2.1 inches.

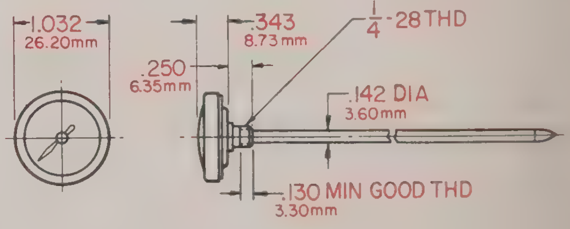
Stem: 18-8 Type 304 stainless steel, .142″ diameter; 2½″ to 12″ stem lengths in ½″ increments. Stem lengths from 12″ to 24″ in 1″ increments with .162″ diameter. 5″ stem length only furnished with spiked tip.

Immersion: For correct indications the stem should be immersed at least 2″ in liquids and 4″ in gases.

Accuracy: Within ½% of range over entire scale.

RANGE	°/DIV.	RANGE	°/DIV.	RANGE	°/DIV.
–40 to 160 F	2	0 to 220 F	2	0 to 150 C	2
25 to 125 F	1	50 to 500 F	5	0 to 250 C	5

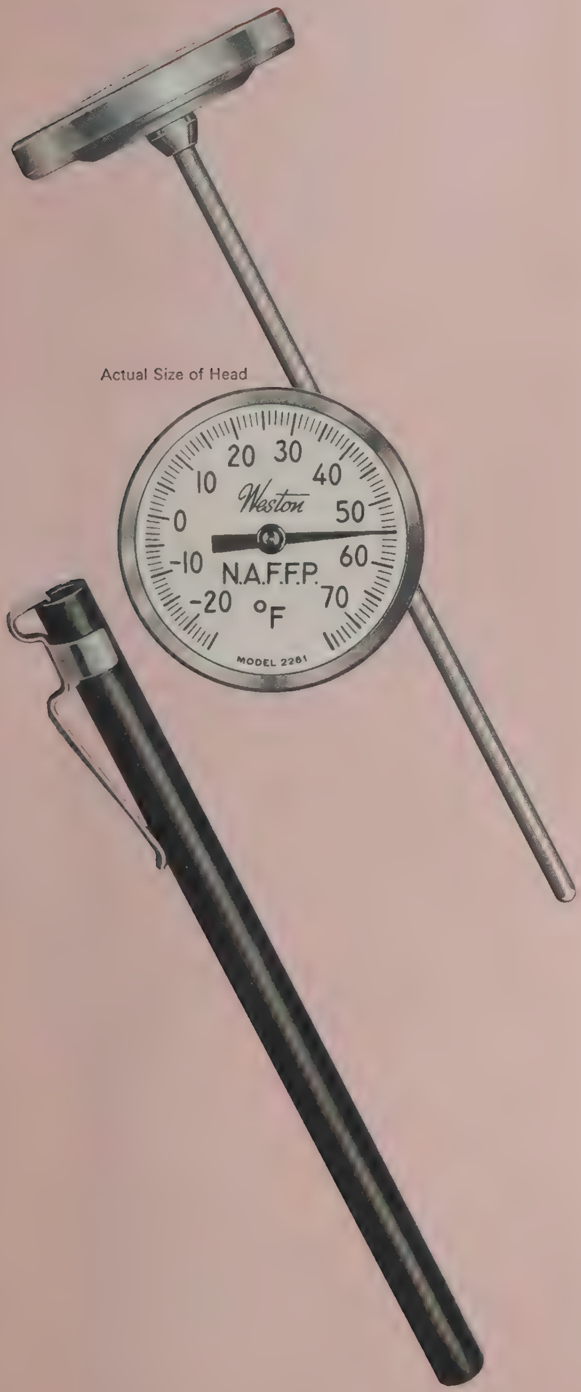
Approximate Weight . . . . 1 oz.



All Dimensions are Approximate.

N.A.F.F.P. FROZEN FOOD THERMOMETER

MODEL 2261-0010241


Actual Size of Head

General: This thermometer, except for the scale glass, is completely encased in stainless steel, which is corrosion resistant to most acids and gases. For protection against corrosives that attack stainless steel, see page 3.

Supplied with hard rubber carrying case with an attached pocket clip.

Head: 1¾" diameter, 18-8 stainless steel case and bezel. Metal scale plate with permanent black figures and markings. Pointer and scale designed for easy reading. Glass window is standard (See page 3 for plastic windows).

Scale Length: 3.40 inches.

Stem: 18-8 Type 304 stainless steel, .142" diameter. Standard stem length is 5" including hub.

Immersion: For correct temperature indications, immerse at least 2" in liquids and 4" in gases.

Accuracy: Within ½ of 1% of the thermometer range (1 F per 200 F or ½ C per 100 C).

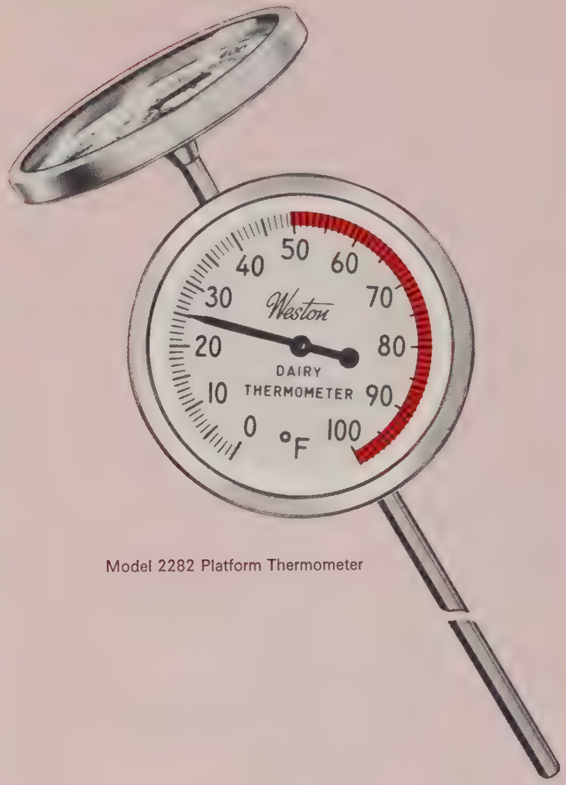
Range: —25 F to 75 F (off-scale temperatures will not damage)

The high standards of quality established for frozen foods are the basic reason for the phenomenal success of the frozen industry. Prime quality is dependent upon correct temperature.

The Weston N.A.F.F.P. Thermometer has been specifically designed to provide accurate reliable temperature measurements for this flourishing industry. This is the bi-metallic thermometer which was used in the national survey *(jointly sponsored by the association of Food and Drug officials of the United States and the National Association of Frozen Food Packers)* on retail handling of frozen foods.

DAIRY THERMOMETERS

MODEL 2282



Model 2282 Platform Thermometer

General: Light in weight, easy to use and ruggedly built. A handle (P/N 95315) is available permitting thermometer to be attached to rim of can.

Head: 2″ diameter. 18-8 stainless steel case and bezel. Metal scale plate with permanent black figures and markings. Scale arc in red from 50-100 F for rapid and accurate inspection. Plastic window is standard.

Scale Length: 4½ inches.

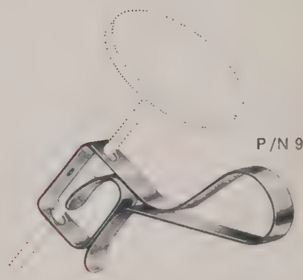
Stem: 18-8 type 304 stainless steel, .162″ dia. x 16″ lg.

Accuracy: Within 1% of the range over the entire scale.

Range: 0-100 F, 1° per division.

Approximate Weight ....2 oz.

Platform Thermometer Handle

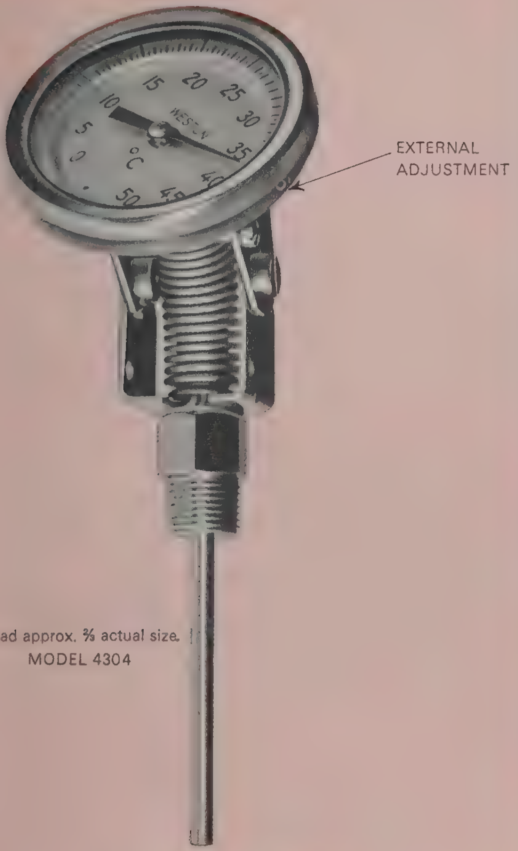


A nickel-plated brass handle is available for the Model 2282 Platform Thermometer, providing added convenience in checking incoming milk. Simplifies attachment of the thermometer directly to the rim of the can.

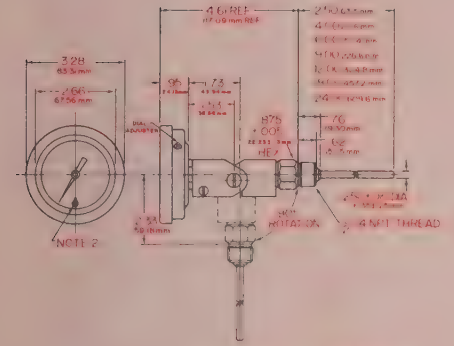
For special Sanitary Wells see page 15.

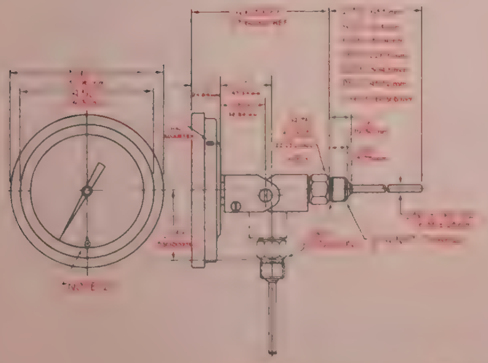
3″ AND 5″ UNIVERSAL ANGLE THERMOMETERS

MODELS 4304 AND 4504



Head approx. ⅔ actual size.
MODEL 4304





All Dimensions are Approximate

Head: Model 4304 3″ diameter and Model 4504 5″ diameter, with stainless steel cases and bezels. Heavy glass windows provide high resistance to breakage. Removable covers simplify replacement of glass in the field. Equipped with quick-lock bezels and special gasket material which protect against breathing and leakage under outdoor environmental conditions and low temperature service without fogging or freeze-up. Even with external changes in temperature "no breathing" action takes place, thus providing the maximum protection for the internal parts of the instruments.

This unique, highly dependable thermometer can be mounted for viewing at *any angle.* The dial can be twisted or tilted on the stem for ease of installation.

Scale and Pointer: In-line scale and pointer provide accurate readings at any eye level. Metal scale plate, with permanent black figures and markings. Pointers are damped against excessive movement in the presence of vibration.

Model 4304 scale length is 6″ and Model 4504 is 10″.

Stem: 18-8 Type 304 Stainless Steel, ¼″ diameter. Standard lengths are 2½″, 4″, 6″, 9″, 12″, 18″ and 24″. (Can also be supplied with stem lengths from 2½″ to 12″ in ½″ increments and from 12″ to 36″ in 1″ increments. From 36″ to 48″ in 6″ increments for Model 4304 and 36″ to 48″ for Model 4504 in 6″ increments on special order.)

All stainless steel welds are used at both plug and case ends of the stem, thus providing high resistance to corrosion.

Connection Nut: 18-8 stainless steel threaded ½″ N.P.T., is standard. Can be supplied with ¾″ N.P.T. at a surcharge.

Immersion: For correct temperature indications the stem should be at least 2″ in liquids and 4″ in gases.

Accuracy: Within ±1% of range over entire scale.

Adjustment: A small ALLEN screw located on the side of the case is available to rotate the scale 360°. Two features result: (1) Recalibration, is performed by placing the stem in a liquid of known temperature and turning the adjusting screw until the scale indication agrees with the bath temperature. (2) If after installation, the scale is at a poor reading angle, the front can be removed, the pointer shifted on its staff, and the thermometer, recalibrated by rotating the scale.

MODELS 4304 and 4504

RANGE	°/DIV.	RANGE	°/DIV.	RANGE	°/DIV.
–100 to 100F	2	50 to 400F	5	–10 to 110C	1
–40 to 120F	1	50 to 500F	5	0 to 50C	½
0 to 200F	2	150 to 750F	10	0 to 100C	1
25 to 125F	1	200 to 1000F*	10	0 to 150C	1
20 to 240F	2	–100 to 50C	1	0 to 200C	2
50 to 300F	2	–50 to 100C	1	0 to 300C	5
				100 to 400C	5

*Not recommended for continuous operation above 800 F.

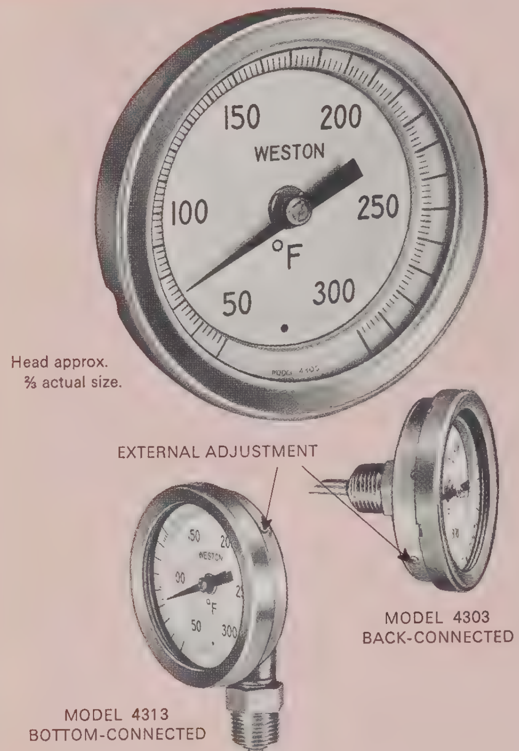
Approximate Weights

Model 4304 2½″ to 24″ stem	1 lb.
Model 4504 2½″ to 24″ stem	1.75 lbs.

3″ AND 5″ STANDARD INDUSTRIAL THERMOMETERS

WITH EXTERNAL ADJUSTMENT

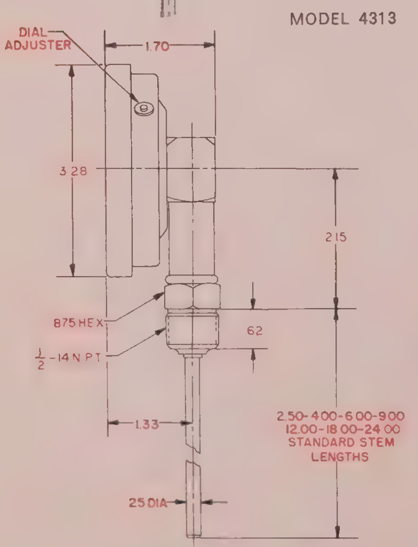
MODELS 4303 AND 4313


150
200
WESTON
100
250
°F
50
300
EXTERNAL ADJUSTMENT

Head approx. ⅔ actual size.

MODEL 4303 BACK-CONNECTED

MODEL 4313 BOTTOM-CONNECTED


MODEL 4313
DIAL ADJUSTER
1.70
3 28
2 15
875 HEX
$\frac{1}{2}$-14 N P T
62
1.33
2.50-4.00-6.00-9.00
12.00-18.00-24.00
STANDARD STEM LENGTHS
25 DIA

DIMENSIONAL DIAGRAM OF
WESTON MODEL 4313 STANDARD INDUSTRIAL THERMOMETER

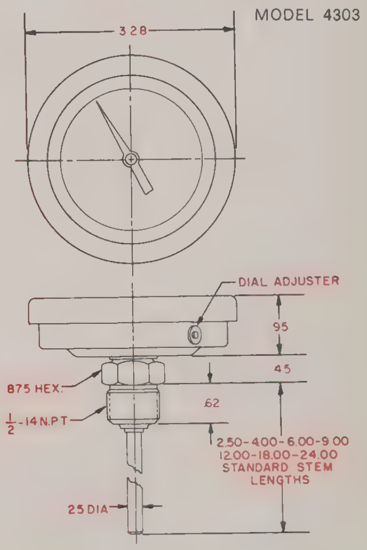
Head: Models 4303/4313 3″ diameter and Models 4503/4513 5″ diameter, with stainless steel cases and bezels. Heavy glass windows provide high resistance to breakage. Removable covers simplify replacement of glass in the field. Equipped with quick-lock bezels and special gasket material which protect against breathing and leakage under outdoor environmental conditions and low temperature service without fogging or freeze-up. Even with external changes in temperature "no breathing" action takes place, thus providing the maximum protection for the internal parts of the instruments.

Scale and Pointer: In-line scale and pointer provide accurate readings at any eye level. Metal scale plate, with permanent black figures and markings. Pointers are damped against excessive movement in the presence of vibration.

Models 4303/4313 scale lengths are 6″ and Models 4503/4513 are 10″.

Stem: 18-8 Type 304 Stainless Steel, ¼″ diameter. Standard lengths are 2½″, 4″, 6″, 9″, 12″, 18″ and 24″. (Can also be supplied with stem lengths from 2½″ to 12″ in ½″ increments and from 12″ to 36″ in 1″ increments. From 36″ to 72″ in 6″ increments for Models 4303/4503 and 36″ to 48″ for Models 4313/4513 in 6″ increments on special order.)

All stainless steel welds are used at both plug and case ends of the stem, thus providing high resistance to corrosion.


MODEL 4303
3 28
DIAL ADJUSTER
95
45
875 HEX
62
$\frac{1}{2}$-14 N.P.T
2.50-4.00-6.00-9.00
12.00-18.00-24.00
STANDARD STEM LENGTHS
25 DIA

DIMENSIONAL DIAGRAM OF
WESTON MODEL 4303 STANDARD INDUSTRIAL THERMOMETER

Connection Nut: 18-8 stainless steel threaded ½" N.P.T., is standard. Can be supplied with ¾" N.P.T. at a surcharge.

Immersion: For correct temperature indications the stem should be at least 2" in liquids and 4" in gases.

Accuracy: Within ±1% of range over entire scale.

Adjustment: A small ALLEN screw located on the side of the case is available to rotate the scale 360°. Two features result: (1) Recalibration, is performed by placing the stem in a liquid of known temperature and turning the adjusting screw until the scale indication agrees with the bath temperature. (2) If after installation, the scale is at a poor reading angle, the front can be removed, the pointer shifted on its staff, and the thermometer, recalibrated by rotating the scale.

MODELS 4303/4313/4503/4513

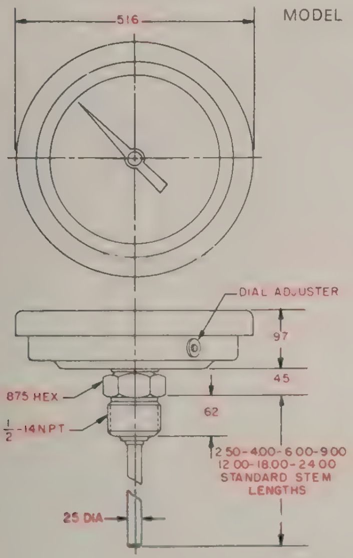
RANGE	°/DIV.	RANGE	°/DIV.	RANGE	°/DIV.
–100 to 100F	2	50 to 400F	5	–10 to 110C	1
–40 to 120F	1	50 to 500F	5	0 to 50C	½
0 to 200F	2	150 to 750F	10	0 to 100C	1
25 to 125F	1	200 to 1000F*	10	0 to 150C	1
20 to 240F	2	–100 to 50C	1	0 to 200C	2
50 to 300F	2	–50 to 100C	1	0 to 300C	5
				100 to 400C	5

*Not recommended for continuous operation above 800 F.

Approximate Weights

2½" to 24" stem..½ lb.

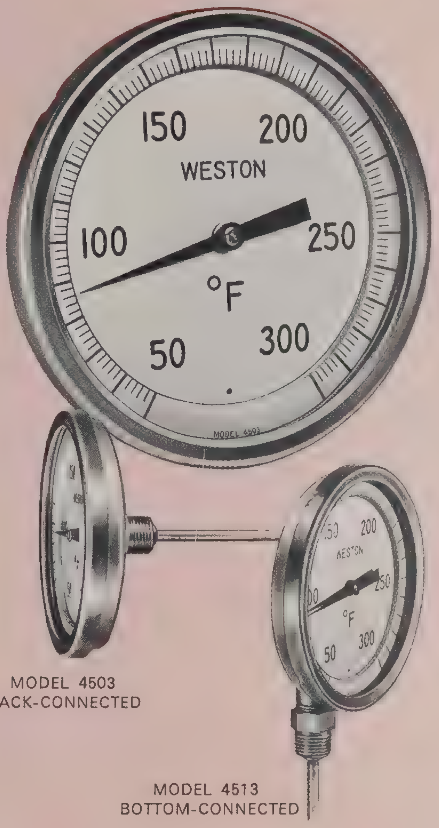
MODEL 4503


516
DIAL ADJUSTER
97
45
875 HEX
62
½-14NPT
2 50-4.00-6 00-9.00
12 00-18.00-24 00
STANDARD STEM
LENGTHS
25 DIA

3" AND 5" STANDARD INDUSTRIAL THERMOMETERS

WITH EXTERNAL ADJUSTMENT

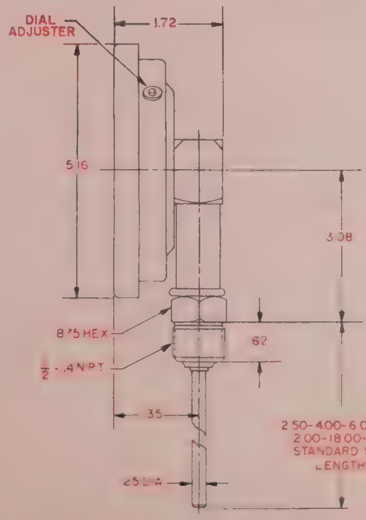
MODELS 4503 AND 4513


150
200
WESTON
100
250
°F
50
300
MODEL 4503

MODEL 4503
BACK-CONNECTED

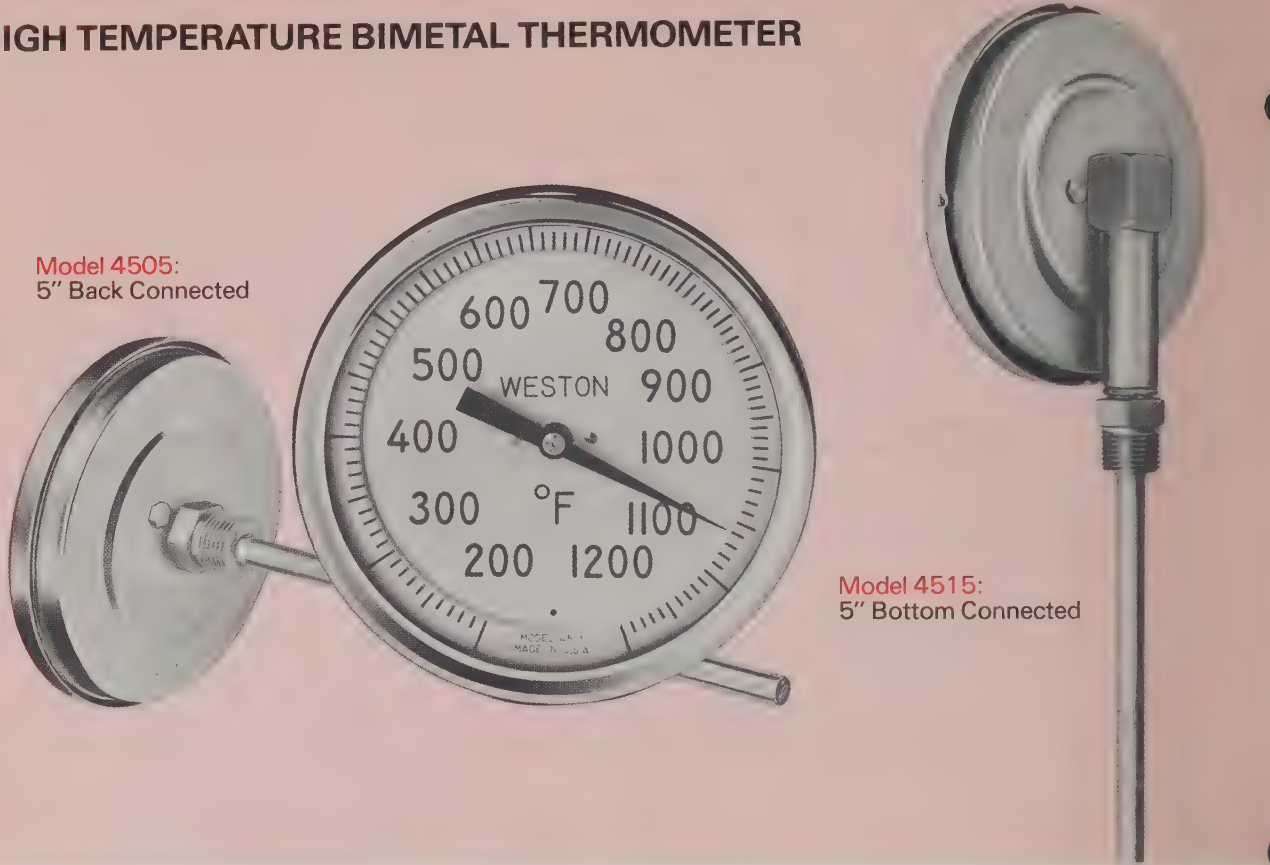
MODEL 4513
BOTTOM-CONNECTED

MODEL 4513


DIAL ADJUSTER
1.72
5 16
3 08
875 HEX
62
½-14NPT
35
2 50-4.00-6 00-9.00
2 00-18 00-24 00
STANDARD STEM
LENGTHS
25 DIA

DIMENSIONAL DIAGRAM OF
WESTON MODEL 4513 HEAVY DUTY THERMOMETER

HIGH TEMPERATURE BIMETAL THERMOMETER



Model 4505:
5″ Back Connected

Model 4515:
5″ Bottom Connected

FEATURES: CONTINUOUS DUTY AT 1200°F / EXTERNAL CALIBRATION / STEM LENGTHS FROM 4″, 6″, 9″, 12″, 18″, 24″ / IMPROVED SEALING / 3″ AND 5″ HEADS—BOTTOM AND BACK CONNECTED / ALL STAINLESS STEEL CONSTRUCTION / EASY-TO-READ DIAL / IMPROVED CORROSION RESISTANCE / IMPROVED VIBRATION AND SHOCK RESISTANCE

WELLS: Information regarding wells for High Temperature Thermometers available upon application.

A bimetal thermometer that maintains its accuracy and stability for thousands of hours in the 850° to 1200°F temperature range—a first in the industry!

A unique and highly dependable thermometer with a range of 200° to 1200°F is designed for continuous duty even at 1200°F! And what's more this thermometer comes with a calibrating feature that can be adjusted in the field to better than ±2% of full scale value. In-line pointer and scale eliminates parallax error from any angle. This highly engineered thermometer offers a rare combination of features made possible through Weston's dedication to engineering detail, manufacturing care, and stringent quality control.

SPECIFICATIONS

Head: Models 4305/4315 3" diameter and Models 4505/4515 5" diameter, with stainless steel cases and bezels. Heavy glass windows provide high resistance to breakage. Equipped with special gasket material which protects against breathing and leakage under outdoor environmental conditions and low temperature service without fogging or freeze-up. Even with external changes in temperature "no breathing" action takes place, thus providing the maximum protection for the internal parts of the instrument.

Scale and Pointer: In-line scale and pointer provide accurate readings at any eye level. Metal scale plate with permanent black figures and markings. Pointers are damped against excessive movement in the presence of vibration.
Models 4305/4315 scale lengths are 6" and Models 4505/4515 are 10".

Stem: 18-8 Type 304 Stainless Steel, 3/8" diameter. Standard lengths are 4", 6", 9", 12", 18" and 24".
All stainless steel welds are used at both plug and case ends of the stem, thus providing high resistance to corrosion.

Approximate Weight: ½ lb.

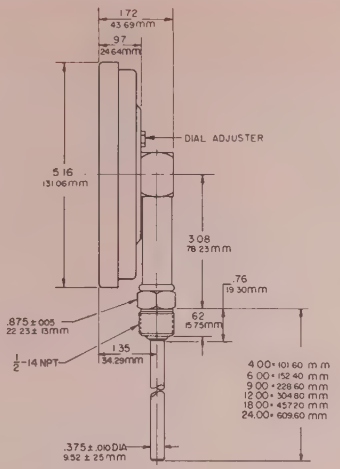
Connection Nut: 18-8 stainless steel threaded ½" N.P.T., is standard.

Immersion: For correct temperature indications the stem should be at least 2" in liquids and 4" in gases.

Accuracy: Within ±2% of range over entire scale.

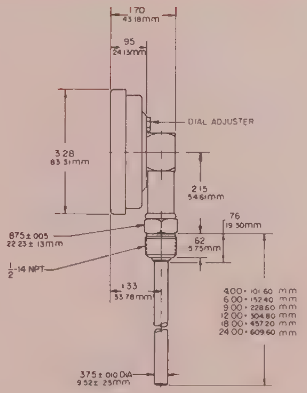
Adjustment: A small HEX nut located on the back of the case is available to rotate the scale 360°. Recalibration is performed by placing the stem in a liquid of known temperature and turning the adjusting nut until the scale indication agrees with the bath temperature.

Model	Range	Div.	Size	Configuration
4305	200/1200°F	10	3"	Back Connected
4315	200/1200°F	10	3"	Bottom Connected
4515	200/1200°F	10	5"	Bottom Connected
4505	200/1200°F	10	5"	Back Connected



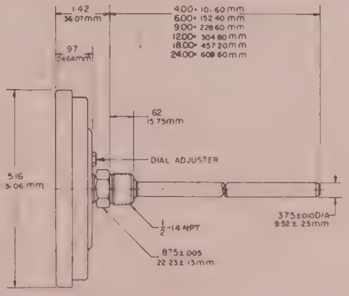
1.72
43.69mm
.97
24.64mm
DIAL ADJUSTER
5.16
131.06mm
3.08
78.23mm
.76
19.30mm
.875±.005
22.23±.13mm
.62
15.75mm
1.35
34.29mm
½-14 NPT
4.00 • 101.60 mm
6.00 • 152.40 mm
9.00 • 228.60 mm
12.00 • 304.80 mm
18.00 • 457.20 mm
24.00 • 609.60 mm
.375±.010 DIA
9.52±.25mm

Model 4515: 5" Bottom Connected



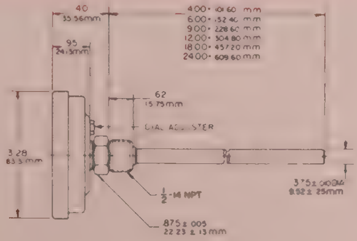
1.70
43.18mm
.95
24.13mm
DIAL ADJUSTER
3.28
83.31mm
2.15
54.61mm
.76
19.30mm
.875±.005
22.23±.13mm
.62
15.75mm
½-14 NPT
1.33
33.78mm
4.00 • 101.60 mm
6.00 • 152.40 mm
9.00 • 228.60 mm
12.00 • 304.80 mm
18.00 • 457.20 mm
24.00 • 609.60 mm
.375±.010 DIA
9.52±.25mm

Model 4315 3" Bottom Connected



1.42
36.07mm
4.00 • 101.60 mm
6.00 • 152.40 mm
9.00 • 228.60 mm
12.00 • 304.80 mm
18.00 • 457.20 mm
24.00 • 609.60 mm
.97
24.64mm
.62
15.75mm
DIAL ADJUSTER
5.16
131.06mm
.375±.010 DIA
9.52±.25mm
½-14 NPT
.875±.005
22.23±.13mm

Model 4505 5" Back Connected

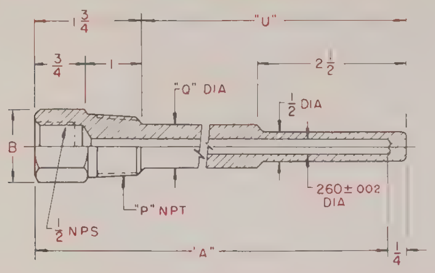


1.40
35.56mm
4.00 • 101.60 mm
6.00 • 152.40 mm
9.00 • 228.60 mm
12.00 • 304.80 mm
18.00 • 457.20 mm
24.00 • 609.60 mm
.95
24.13mm
.62
15.75mm
DIAL ADJUSTER
3.28
83.31mm
½-14 NPT
.375±.010 DIA
9.52±.25mm
.875±.005
22.23±.13mm

Model 4305 3" Back Connected

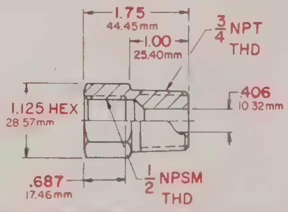
WESTON WELLS AND BUSHINGS

Wells WITHOUT Lagging Extension



A	B	P	Q	U	MATERIAL	MATERIAL TYPE	PART NUMBER
4	1 1/8	3/4	—	2 1/2	Carbon Steel	AISI C-1018	95327-001
4	1 1/8	3/4	—	2 1/2	Brass	ASTM B-16	95440-001
4	1 1/8	3/4	—	2 1/2	Stainless Steel	AISI 304	95330-124
4	1 1/8	3/4	—	2 1/2	Stainless Steel	AISI 316	96159-124
4	1 3/8	1	—	2 1/2	Carbon Steel	AISI C-1018	95868-001
4	1 3/8	1	—	2 1/2	Brass	ASTM B-16	95872-001
4	1 3/8	1	—	2 1/2	Stainless Steel	AISI 304	95871-124
4	1 3/8	1	—	2 1/2	Stainless Steel	AISI 316	96618-124
6	1 1/8	3/4	3/4	4 1/2	Carbon Steel	AISI C-1018	95443-001
6	1 1/8	3/4	3/4	4 1/2	Brass	ASTM B-16	95447-001
6	1 1/8	3/4	3/4	4 1/2	Stainless Steel	AISI 304	95446-124
6	1 1/8	3/4	3/4	4 1/2	Stainless Steel	AISI 316	96133-124
6	1 3/8	1	7/8	4 1/2	Carbon Steel	AISI C-1018	95880-001
6	1 3/8	1	7/8	4 1/2	Brass	ASTM B-16	95884-001
6	1 3/8	1	7/8	4 1/2	Stainless Steel	AISI 304	95883-124
6	1 3/8	1	7/8	4 1/2	Stainless Steel	AISI 316	96619-124
9	1 1/8	3/4	3/4	7 1/2	Carbon Steel	AISI C-1018	96053-001
9	1 1/8	3/4	3/4	7 1/2	Brass	ASTM B-16	96055-001
9	1 1/8	3/4	3/4	7 1/2	Stainless Steel	AISI 304	172756-124
9	1 1/8	3/4	3/4	7 1/2	Stainless Steel	AISI 316	173302-124
9	1 3/8	1	7/8	7 1/2	Carbon Steel	AISI C-1018	96588-001
9	1 3/8	1	7/8	7 1/2	Brass	ASTM B-16	96584-001
9	1 3/8	1	7/8	7 1/2	Stainless Steel	AISI 304	172760-124
9	1 3/8	1	7/8	7 1/2	Stainless Steel	AISI 316	173306-124
12	1 1/8	3/4	3/4	10 1/2	Carbon Steel	AISI C-1018	95948-001
12	1 1/8	3/4	3/4	10 1/2	Brass	ASTM B-16	95945-001
12	1 1/8	3/4	3/4	10 1/2	Stainless Steel	AISI 304	172757-124
12	1 1/8	3/4	3/4	10 1/2	Stainless Steel	AISI 316	173303-124
12	1 3/8	1	7/8	10 1/2	Carbon Steel	AISI C-1018	96589-001
12	1 3/8	1	7/8	10 1/2	Brass	ASTM B-16	96585-001
12	1 3/8	1	7/8	10 1/2	Stainless Steel	AISI 304	172761-124
12	1 3/8	1	7/8	10 1/2	Stainless Steel	AISI 316	173307-124
18	1 1/8	3/4	3/4	16 1/2	Carbon Steel	AISI C-1018	95949-001
18	1 1/8	3/4	3/4	16 1/2	Brass	ASTM B-16	95946-001
18	1 1/8	3/4	3/4	16 1/2	Stainless Steel	AISI 304	172758-124
18	1 1/8	3/4	3/4	16 1/2	Stainless Steel	AISI 316	173304-124
18	1 3/8	1	7/8	16 1/2	Carbon Steel	AISI C-1018	96590-001
18	1 3/8	1	7/8	16 1/2	Brass	ASTM B-16	96586-001
18	1 3/8	1	7/8	16 1/2	Stainless Steel	AISI 304	172762-124
18	1 3/8	1	7/8	16 1/2	Stainless Steel	AISI 316	173308-124
24	1 1/8	3/4	3/4	22 1/2	Carbon Steel	AISI C-1018	95950-001
24	1 1/8	3/4	3/4	22 1/2	Brass	ASTM B-16	95947-001
24	1 1/8	3/4	3/4	22 1/2	Stainless Steel	AISI 304	172759-124
24	1 1/8	3/4	3/4	22 1/2	Stainless Steel	AISI 316	173305-124
24	1 3/8	1	7/8	22 1/2	Carbon Steel	AISI C-1018	96591-001
24	1 3/8	1	7/8	22 1/2	Brass	ASTM B-16	96587-001
24	1 3/8	1	7/8	22 1/2	Stainless Steel	AISI 304	172763-124
24	1 3/8	1	7/8	22 1/2	Stainless Steel	AISI 316	17330 -124

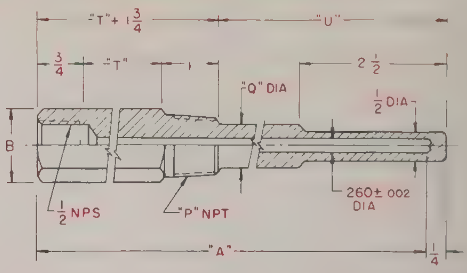
Bushings WITHOUT Lagging Extension



All Dimensions are Approximate.

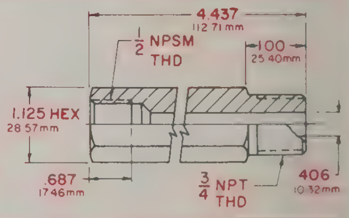
MATERIAL	MATERIAL TYPE	PART NUMBER
Brass	ASTM B-16	95980-001
Carbon steel	AISI C-1018	95981-001
Stainless steel	AISI 304	95982-124

Wells WITH Lagging Extension



A	B	P	Q	U	T	MATERIAL	MATERIAL TYPE	PART NUMBER
6	1 1/8	3/4	—	2 1/2	2	Carbon Steel	AISI C-1018	95332-001
6	1 1/8	3/4	—	2 1/2	2	Brass	ASTM B-16	95441-001
6	1 1/8	3/4	—	2 1/2	2	Stainless Steel	AISI 304	95335-124
6	1 1/8	3/4	—	2 1/2	2	Stainless Steel	AISI 316	96134-124
6	1 3/8	1	—	2 1/2	2	Carbon Steel	AISI 2-1018	95874-001
6	1 3/8	1	—	2 1/2	2	Brass	ASTM B-16	95878-001
6	1 3/8	1	—	2 1/2	2	Stainless Steel	AISI 304	95877-124
6	1 3/8	1	—	2 1/2	2	Stainless Steel	AISI 316	96631-124
9	1 1/8	3/4	3/4	4 1/2	3	Carbon Steel	AISI C-1018	95830-001
9	1 1/8	3/4	3/4	4 1/2	3	Brass	ASTM B-16	95834-001
9	1 1/8	3/4	3/4	4 1/2	3	Stainless Steel	AISI 304	172764-124
9	1 1/8	3/4	3/4	4 1/2	3	Stainless Steel	AISI 316	173310-124
9	1 3/8	1	7/8	4 1/2	3	Carbon Steel	AISI C-1018	96606-001
9	1 3/8	1	7/8	4 1/2	3	Brass	ASTM B-16	96596-001
9	1 3/8	1	7/8	4 1/2	3	Stainless Steel	AISI 304	172768-124
9	1 3/8	1	7/8	4 1/2	3	Stainless Steel	AISI 316	173314-124
12	1 1/8	3/4	3/4	7 1/2	3	Carbon Steel	AISI C-1018	95959-001
12	1 1/8	3/4	3/4	7 1/2	3	Brass	ASTM B-16	95956-001
12	1 1/8	3/4	3/4	7 1/2	3	Stainless Steel	AISI 304	172765-124
12	1 1/8	3/4	3/4	7 1/2	3	Stainless Steel	AISI 316	173311-124
12	1 3/8	1	7/8	7 1/2	3	Carbon Steel	AISI C-1018	96607-001
12	1 3/8	1	7/8	7 1/2	3	Brass	ASTM B-16	96597-001
12	1 3/8	1	7/8	7 1/2	3	Stainless Steel	AISI 304	172769-124
12	1 3/8	1	7/8	7 1/2	3	Stainless Steel	AISI 316	173315-124
18	1 1/8	3/4	3/4	13 1/2	3	Carbon Steel	AISI C-1018	95960-001
18	1 1/8	3/4	3/4	13 1/2	3	Brass	ASTM B-16	95957-001
18	1 1/8	3/4	3/4	13 1/2	3	Stainless Steel	AISI 304	172766-124
18	1 1/8	3/4	3/4	13 1/2	3	Stainless Steel	AISI 316	173312-124
18	1 3/8	1	7/8	13 1/2	3	Carbon Steel	AISI C-1018	96608-001
18	1 3/8	1	7/8	13 1/2	3	Brass	ASTM B-16	96598-001
18	1 3/8	1	7/8	13 1/2	3	Stainless Steel	AISI 304	172770-124
18	1 3/8	1	7/8	13 1/2	3	Stainless Steel	AISI 316	173316-124
24	1 1/8	3/4	3/4	19 1/2	3	Carbon Steel	AISI C-1018	95961-001
24	1 1/8	3/4	3/4	19 1/2	3	Brass	ASTM B-16	95958-001
24	1 1/8	3/4	3/4	19 1/2	3	Stainless Steel	AISI 304	172767-124
24	1 1/8	3/4	3/4	19 1/2	3	Stainless Steel	AISI 316	173313-124
24	1 3/8	1	7/8	19 1/2	3	Carbon Steel	AISI C-1018	96609-001
24	1 3/8	1	7/8	19 1/2	3	Brass	ASTM B-16	96599-001
24	1 3/8	1	7/8	19 1/2	3	Stainless Steel	AISI 304	172771-124
24	1 3/8	1	7/8	19 1/2	3	Stainless Steel	AISI 316	173317-124

Bushings WITH Lagging Extension



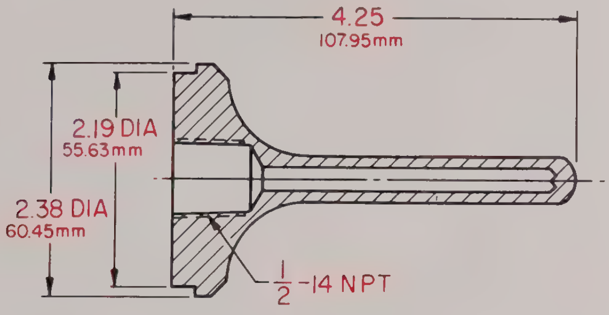
All Dimensions are Approximate.

MATERIAL	MATERIAL TYPE	PART NUMBER
Brass	ASTM B-16	95975-001
Carbon steel	AISI C-1018	95976-001
Stainless steel	AISI 304	95977-124

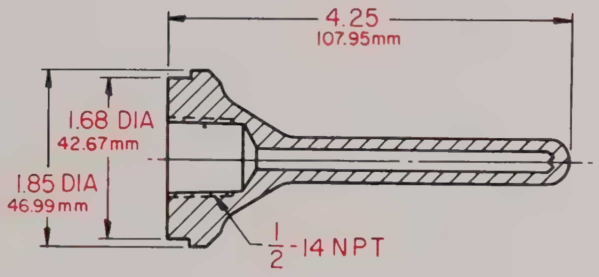
Wells: Wells of other materials can be supplied on special order. Correspondence is invited.

WELLS — SANITARY

Designed to fit 1½" and 2" Bevel Joint 3A Sanitary Fittings. Made from solid 18-8 Type 304 stainless steel, with a 180 Grit Polish or better. They will accommodate Weston Standard Industrial Thermometers such as Models 4300, 4310, 4500, and 4510 having a 4" long by ¼" diameter stem and ½" N. P. T. connection nut.


4.25
107.95mm
2.19 DIA
55.63mm
2.38 DIA
60.45mm
1/2-14 NPT

P/N 97276 (Fits 2" 3A Fitting)


4.25
107.95mm
1.68 DIA
42.67mm
1.85 DIA
46.99mm
1/2-14 NPT

P/N 97277 (Fits 1½" 3A Fitting)

All Dimensions are Approximate.

Wells: Wells of other materials can be supplied on special order. Correspondence is invited.

WESTON INSTRUMENTS DIVISION
WESTON INSTRUMENTS, INC.
614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
a Schlumberger company

09-108-D 8/69 PG

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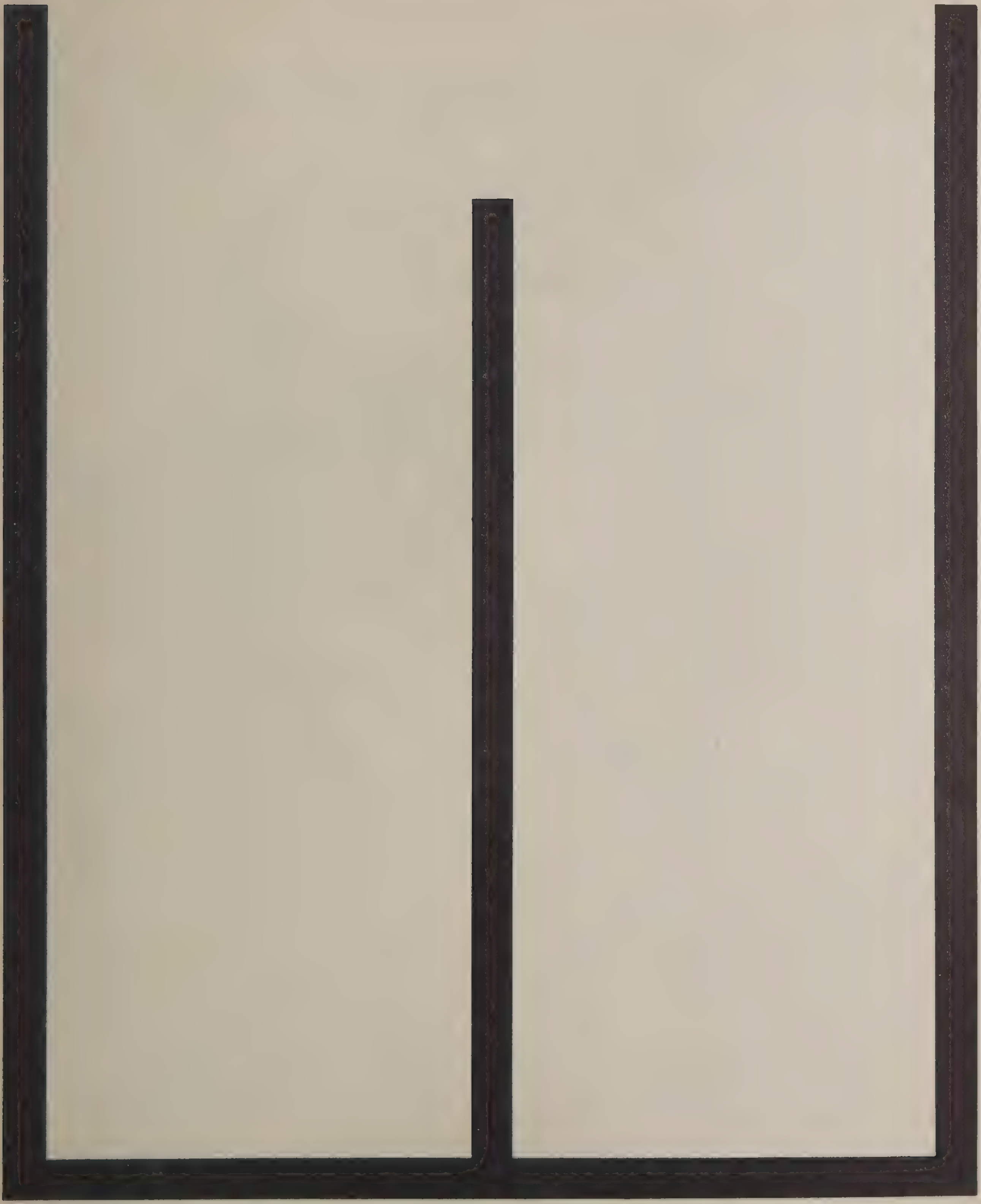


BIMETAL THERMOMETERS PRICE LIST

NOTICE

ALL ITEMS HEREIN ARE SUBJECT TO DISCONTINUANCE AS STOCK ITEMS AT ANY TIME WITHOUT PRIOR NOTICE. REFER TO THE WEEKLY FINISHED GOODS INVENTORY FOR THE STATUS AND STOCK CONDITION OF ANY ITEM.

WESTON®

BIMETAL THERMOMETERS PRICE LIST

PRICE LIST
09-108
Effective
JAN. 1, 1971
Supersedes Issue
Dated 1/1/70

All Prices Subject to Change Without Notice and are F.O.B. Factory, Newark, N.J.

LABORATORY THERMOMETERS

TEST THERMOMETERS
Model 2261

	8" Stem Length	
Range	Catalog No.	Price
–100 to 100 F	2261-0010048 s	$10.00
25 to 125 F	2261-0010028 s	
–40 to 160 F	2261-0010047 s	
0 to 180 F	2261-0010092 s	
0 to 220 F	2261-0010016 s	
50 to 250 F	2261-0010104 s	
50 to 300 F	2261-0010086 s	
50 to 400 F	2261-0010030 s	
50 to 500 F	2261-0010091 s	
–100 to 40 C	2261-0010009 s	
0 to 50 C	2261-0010099 s	
–50 to 100 C	2261-0010103 s	
–10 to 110 C	2261-0010140 s	
0 to 100 C	2261-0010077 s	
0 to 150 C	2261-0010040 s	
0 to 250 C	2261-0010126 s	

Model 2261

	5" Stem Length	
25 to 125 F	2261-0010128	$11.00

Model 2261

	18" Stem Length	
0 to 220 F	2261-0010073	$15.00

Model 2261

Range	Stem Length	Catalog No.	Price
50 to 400 F	4"	2261-0010050	$11.00
50 to 500 F	2"	2261-0010025	
50 to 500 F	2½"	2261-0010120	
50 to 500 F	3"	2261-0010080	
50 to 500 F	4"	2261-0010136	

Model 2261 Plastic Window

	8" Stem Length	
Range	Catalog No.	Price
25 to 125 F	2261-0010163	$12.00
0 to 180 F	2261-0010071	
0 to 220 F	2261-0010152	

Model 2261 Spike Stem

	5" Stem Length		8" Stem Length	
Range	Catalog No.	Price	Catalog No.	Price
–40 to 160 F	2261-0010052	$11.00	2261-0010010	$ 11.00
0 to 180 F	2261-0010076		2261-0010034	
0 to 220 F	2261-0010051		2261-0010056	
25 to 125 F	2261-0010107		2261-0010075	

TEST THERMOMETERS
(Externally Adjustable)
Model 4200

	8" Stem Length	
Range	Catalog No.	Price
–100 to 100 F	4200-0020900 s	$11.00
25 to 125 F	4200-0020901 s	
– 40 to 160 F	4200-0020902 s	
0 to 180 F	4200-0020903 s	
0 to 220 F	4200-0020904 s	
50 to 250 F	4200-0020905 s	
50 to 300 F	4200-0020906 s	
50 to 400 F	4200-0020907 s	
50 to 500 F	4200-0020908 s	
–100 to 40 C	4200-0020909 s	
0 to 50 C	4200-0020910 s	
–50 to 100 C	4200-0020911 s	
–10 to 110C	4200-0020912 s	
0 to 100 C	4200-0020913 s	
0 to 150 C	4200-0020914 s	
0 to 250 C	4200-0020915 s	

POCKET THERMOMETER (Externally Adjustable)
Model 2292

Range	°/Div.	Catalog Number	Price
–40/160F	2° Div.	2292-0017602 s	$12.00
25/125F	1° Div.	2292-0017601 s	
0/220F	2° Div.	2292-0017600 s	
50/500F	5° Div.	2292-0017603 s	
0/150C	2° Div.	2292-0017604 s	
0/250C	5° Div.	2292-0017605 s	

MIRROBAND® PRECISION
Testing Thermometer
Model 2284

	8" Stem Length	
Range	Catalog No.	Price
25 to 125 F	2284-0019400	$13.00
–20 to 100 F	2284-0019401	
0 to 220 F	2284-0019402	
50 to 250 F	2284-0019403	
50 to 500 F	2284-0019404	
–10 to 110 C	2284-0019405	
0 to 250 C	2284-0019406	

MIDGET THERMOMETER
Model 2291

Range
–40 to 160 F
25 to 125 F
0 to 220 F
50 to 500 F
0 to 150 C
0 to 250 C

(Price on Application)

"s" Normally carried in stock. Do not include "s" in your order write up.

GENERAL PURPOSE THERMOMETERS

Model 2281 (with Standard ¼" N.P.T. Connection Nut)

Range	2½" Stem Length		4" Stem Length		6" Stem Length		9" Stem Length	
	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price
–100 to 100 F	2281-0015073	$ 13.00	2281-0015096	$ 12.60	2281-0015065	$ 12.60	2281-0015171	$ 15.00
– 40 to 120 F	2281-0015016 s	↓	2281-0015017s	↓	2281-0015018s	↓	2281-0015019	↓
25 to 125 F	2281-0015012 s		2281-0015013s		2281-0015014s		2281-0015142	
0 to 200 F	2281-0015000 s		2281-0015001s		2281-0015002s		2281-0015082	
20 to 240 F	2281-0015007 s		2281-0015008s		2281-0015009s		2281-0015066	
50 to 300 F	2281-0015021 s		2281-0015023s		2281-0015024s		2281-0015025	
50 to 400 F	2281-0015028 s		2281-0015029s		2281-0015030s		2281-0015074	
50 to 500 F	2281-0015032 s		2281-0015033s		2281-0015034s		2281-0015035	
150 to 750 F	2281-0015037 s		2281-0015038s		2281-0015039s		2281-0015040	
200 to 1000 F*	2281-0015042		2281-0015043		2281-0015044		2281-0015045	
–100 to 50 C	2281-0015146		2281-0015095		2281-0015079		2281-0015120	
0 to 50 C	2281-0015071		2281-0015088		2281-0015063		2281-0015092	
– 50 to 100 C	2281-0015107		2281-0015059		2281-0015111		2281-0015119	
0 to 100 C	2281-0015048		2281-0015049		2281-0015050		2281-0015097	
– 10 to 100 C	2281-0015081		2281-0015125		2281-0015058		2281-0015091	
0 to 150 C	2281-0015051		2281-0015052		2281-0015101		2281-0015159	
0 to 200 C	2281-0015053		2281-0015084		2281-0015054		2281-0015068	
0 to 300 C	2281-0015138		2281-0015122		2281-0015055		2281-0015056	
100 to 400 C	2281-0015193		2281-0015136		2281-0015061		2281-0015062	

Model 2281 (With Standard ¼" N.P.T. Connection Nut)

Range	12" Stem Length		18" Stem Length		24" Stem Length	
	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price
–100 to 100 F	2281-0015064	$ 15.00	2281-0015139	$17.00	2281-0015179	$19.00
– 40 to 120 F	2281-0015020	↓	2281-0015129	↓	2281-0015180	↓
25 to 125 F	2281-0015015		2281-0015103		2281-0015123	
0 to 200 F	2281-0015004		2281-0015005		2281-0015127	
20 to 240 F	2281-0015010		2281-0015011		2281-0015078	
50 to 300 F	2281-0015026		2281-0015027		2281-0015067	
50 to 400 F	2281-0015031		2281-0015100		2281-0015130	
50 to 500 F	2281-0015036		2281-0015089		2281-0015126	
150 to 750 F	2281-0015041		2281-0015077		2281-0015181	
200 to 1000 F*	2281-0015046		2281-0015047		2281-0015080	
–100 to 50 C	2281-0015060		2281-0015182		2281-0015134	
0 to 50 C	2281-0015183		2281-0015170		2281-0015184	
–50 to 100C	2281-0015133		2281-0015185		2281-0015186	
0 to 100 C	2281-0015116		2281-0015102		2281-0015150	
– 10 to 110 C	2281-0015187		2281-0015188		2281-0015189	
0 to 150 C	2281-0015141		2281-0015132		2281-0015131	
0 to 200 C	2281-0015093		2281-0015178		2281-0015190	
0 to 300 C	2281-0015191		2281-0015192		2281-0015114	
100 to 400 C	2281-0015128		2281-0015162		2281-0015194	

Model 2282 (Stem Length Includes Hub)

Range	8" Stem Length	
	Catalog No.	Price
–100 to 100 F	2282-0016010	$ 12.00
25 to 125 F	2282-0016003	↓
–-40 to 160 F	2282-0016041	
0 to 180 F	2282-0016001	
0 to 220 F	2282-0016002	
50 to 250 F	2282-0016006	
50 to 300 F	2282-0016007	
50 to 400 F	2282-0016008	
50 to 500 F	2282-0016009	
–100 to 40 C	2282-0016015	
0 to 50 C	2282-0016011	
–50 to 100C	2282-0016030	
–10 to 110C	2282-0016036	
0 to 100 C	2282-0016012	
0 to 150 C	2282-0016013	
0 to 250 C	2282-0016014	
–100 to 540 C –150 to 100 F	2282-0016044	17.00
–100 to 260 C –150 to 500 F	2282-0016045	15.50

ROAST THERMOMETER

Model 2261-0910051 (10 to 220°F; 5 in. stem)	$ 10.00 s

DAIRY THERMOMETERS AND WELLS

Model 2282-0016000 Dairy Platform Thermometer	$ 20.75
Model 9966 Handle P/N 95315-024 Model 2282	3.00s
Model 9966 P/N 97276 Sanitary Well (Fits 2" 3A Fitting)	32.25 s
Model 9966 P/N 97277 Sanitary Well (Fits 1½" 3A Fitting)	32.25 s

N.A.F.F.P. FROZEN FOOD THERMOMETER

Model 2261-0010241 s (with carrying case)	$ 10.75 s

*Not recommended for continuous operation above 800°F.

"s" Normally carried in stock. Do not include "s" in your order write up.

3" STANDARD INDUSTRIAL THERMOMETERS

Model 4303 (Back Connected — Angle Form)

Range	2½" Stem Length		4" Stem Length		6" Stem Length		9" Stem Length	
	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price
−100 to 100F	4303-0020007	$15.50	4303-0020008	$15.00	4303-0020009	$15.00	4303-0020010	$16.80
−40 to 120F	4303-0020042s	↓	4303-0020043s	↓	4303-0020044s	↓	4303-0020045s	↓
25 to 125F	4303-0020028s	↓	4303-0020029s	↓	4303-0020030s	↓	4303-0020031s	↓
0 to 200F	4303-0020000s	↓	4303-0020001s	↓	4303-0020002s	↓	4303-0020003s	↓
20 to 240F	4303-0020035s	↓	4303-0020036s	↓	4303-0020037s	↓	4303-0020038s	↓
50 to 300F	4303-0020049s	↓	4303-0020050s	↓	4303-0020051s	↓	4303-0020052s	↓
50 to 400F	4303-0020056s	↓	4303-0020057s	↓	4303-0020058s	↓	4303-0020059s	↓
50 to 500F	4303-0020063s	↓	4303-0020064s	↓	4303-0020065s	↓	4300-0020066s	↓
150 to 750F	4303-0020014s	↓	4303-0020015s	↓	4303-0020016s	↓	4303-0020017s	↓
200 to 1000F*	4303-0020021s	↓	4303-0020022s	↓	4303-0020023s	↓	4303-0020024s	↓
−100 to 50C	4303-0020119	↓	4303-0020120	↓	4303-0020121	↓	4303-0020122	↓
0 to 50C	4303-0020091s	↓	4303-0020092s	↓	4303-0020093s	↓	4303-0020094	↓
−50 to 100C	4303-0020126	↓	4303-0020127	↓	4303-0020128	↓	4303-0020129	↓
0 to 100C	4303-0020098s	↓	4303-0020099s	↓	4303-0020100s	↓	4303-0020101	↓
−10 to 110C	4303-0020105s	↓	4303-0020106s	↓	4303-0020107s	↓	4303-0020108	↓
0 to 150C	4303-0020070s	↓	4303-0020071s	↓	4303-0020072s	↓	4303-0020073	↓
0 to 200C	4303-0020077s	↓	4303-0020078s	↓	4303-0020079s	↓	4303-0020080	↓
0 to 300C	4303-0020084s	↓	4303-0020085s	↓	4303-0020086s	↓	4303-0020087	↓
100 to 400C	4303-0020112	↓	4303-0020113	↓	4303-0020114	↓	4303-0020115	↓

Model 4303 (Back Connected — Angle Form)

Range	12" Stem Length		18" Stem Length		24" Stem Length	
	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price
−100 to 100F	4303-0020011	$16.80	4303-0020012	$20.00	4303-0020013	$22.00
−40 to 120F	4303-0020046s	↓	4303-0020047	↓	4303-0020048	↓
25 to 125F	4303-0020032s	↓	4303-0020033	↓	4303-0020034	↓
0 to 200F	4303-0020004s	↓	4303-0020005	↓	4303-0020006	↓
20 to 240F	4303-0020039s	↓	4303-0020040	↓	4303-0020041	↓
50 to 300F	4303-0020053s	↓	4303-0020054	↓	4303-0020055s	↓
50 to 400F	4303-0020060s	↓	4303-0020061	↓	4303-0020062	↓
50 to 500F	4303-0020067s	↓	4303-0020068	↓	4303-0020069	↓
150 to 750F	4303-0020018s	↓	4303-0020019	↓	4303-0020020	↓
200 to 1000F*	4303-0020025s	↓	4303-0020026s	↓	4303-0020027s	↓
−100 to 50C	4303-0020123	↓	4303-0020124	↓	4303-0020125	↓
0 to 50C	4303-0020095	↓	4303-0020096	↓	4303-0020097	↓
−50 to 100C	4303-0020130	↓	4303-0020131	↓	4303-0020132	↓
0 to 100C	4303-0020102s	↓	4303-0020103	↓	4303-0020104	↓
−10 to 110C	4303-0020109	↓	4303-0020110	↓	4303-0020111	↓
0 to 150C	4303-0020074	↓	4303-0020075	↓	4303-0020076	↓
0 to 200C	4303-0020081	↓	4303-0020082	↓	4303-0020083	↓
0 to 300C	4303-0020088	↓	4303-0020089	↓	4303-0020090	↓
100 to 400C	4303-0020116	↓	4303-0020117	↓	4303-0020118	↓

*Not recommended for continuous operation above 800°F.

NOTE: Prices are for Thermometers with fixed connection ½" NPT. They are also available with union connection ½" NPT — Add $3.00 net surcharge.

"s" Normally carried in stock. Do not include "s" in your order write up.

3″ STANDARD INDUSTRIAL THERMOMETERS (Cont'd.)

Model 4313 (Bottom Connected – Straight Form)

Range	2½″ Stem Length		4″ Stem Length		6″ Stem Length		9″ Stem Length	
	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price
–100 to 100F	4313-0020207	$25.50	4313-0020208	$25.00	4313-0020209	$25.00	4313-0020210	$27.00
–40 to 120F	4313-0020242	↓	4313-0020243s	↓	4313-0020244	↓	4313-0020245	↓
25 to 125F	4313-0020228		4313-0020229		4313-0020230		4313-0020231	
0 to 200F	4313-0020200s		4313-0020201s		4313-0020202s		4313-0020203	
20 to 240F	4313-0020235s		4313-0020236s		4313-0020237s		4313-0020238	
50 to 300F	4313-0020249s		4313-0020250s		4313-0020251s		4313-0020252	
50 to 400F	4313-0020256s		4313-0020257s		4313-0020258s		4313-0020259	
50 to 500F	4313-0020263s		4313-0020264s		4313-0020265s		4313-0020266	
150 to 750F	4313-0020214		4313-0020215s		4313-0020216s		4313-0020217	
200 to 1000F*	4313-0020221		4313-0020222		4313-0020223		4313-0020224	
–100 to 50C	4313-0020319		4313-0020320		4313-0020321		4313-0020322	
–50 to 100C	4313-0020326		4313-0020327		4313-0020328		4313-0020329	
0 to 100C	4313-0020298		4313-0020299		4313-0020300		4313-0020301	
–10 to 110C	4313-0020305		4313-0020306		4313-0020307		4313-0020308	
0 to 150C	4313-0020270		4313-0020271		4313-0020272		4313-0020273	
0 to 200C	4313-0020277		4313-0020278		4313-0020279		4313-0020280	
0 to 300C	4313-0020284		4313-0020285		4313-0020286		4313-0020287	
100 to 400C	4313-0020312		4313-0020313		4313-0020314		4313-0020315	

Model 4313 (Bottom Connected – Straight Form)

Range	12″ Stem Length		18″ Stem Length		24″ Stem Length	
	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price
–100 to 100F	4313-0020211	$27.00	4313-0020212	$29.00	4313-0020213	$31.00
–40 to 120F	4313-0020246	↓	4313-0020247	↓	4313-0020248	↓
25 to 125F	4313-0020232		————————		————————	
0 to 200F	4313-0020204		4313-0020205		4313-0020206	
20 to 240F	4313-0020239		4313-0020240		4313-0020241	
50 to 300F	4313-0020253		4313-0020254		4313-0020255	
50 to 400F	4313-0020260		4313-0020261		4313-0020262	
50 to 500F	4313-0020267		4313-0020268		4313-0020269	
150 to 750F	4313-0020218		4313-0020219		4313-0020220	
200 to 1000F*	4313-0020225		4313-0020226		4313-0020227	
–100 to 50C	4313-0020323		4313-0020324		4313-0020325	
–50 to 100C	4313-0020330		4313-0020331		4313-0020332	
0 to 100C	4313-0020302		4313-0020303		4313-0020304	
–10 to 110C	4313-0020309		4313-0020310		4313-0020311	
0 to 150C	4313-0020274		4313-0020275		4313-0020276	
0 to 200C	4313-0020281		4313-0020282		4313-0020283	
0 to 300C	4313-0020288		4313-0020289		4313-0020290	
100 to 400C	4313-0020316		4313-0020317		4313-0020318	

*Not recommended for continuous operation above 800°F.

NOTE: Prices are for Thermometers with fixed connection ½″ NPT.
They are also available with union connection ½″ NPT –
Add $3.00 net surcharge.

"s" Normally carried in stock. Do not include "s" in your order write up.

3" UNIVERSAL ANGLE THERMOMETER

Model 4304

Range	2½" Stem Length		4" Stem Length		6" Stem Length		9" Stem Length	
	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price
−100 to 100F	4304-1002514	$28.75	4304-1004014	$28.75	4304-1006014	$28.75	4304-1009014	$31.00
−40 to 120F	4304-1202514		4304-1204014		4304-1206014		4304-1209014	
25 to 125F	4304-2002514		4304-2004014		4304-2006014		4304-2009014	
0 to 200F	4304-1602514s		4304-1604014s		4304-1606014s		4304-1609014	
20 to 240F	4304-1902514s		4304-1904014s		4304-1906014s		4304-1909014	
50 to 300F	4304-2302514		4304-2304014s		4304-2306014		4304-2309014	
50 to 400F	4304-2402514		4304-2404014s		4304-2406014s		4304-2409014	
50 to 500F	4304-2502514		4304-2504014s		4304-2506014s		4304-2509014	
150 to 750F	4304-2702514		4304-2704014		4304-2706014		4304-2709014	
200 to 1000F*	4304-2802514		4304-2804014		4304-2806014		4304-2809014	
−100 to 50C	4304-5002514		4304-5004014		4304-5006014		4304-5009014	
0 to 50C	4304-5402514		4304-5404014		4304-5406014		4304-5409014	
−50 to 100C	4304-5202514		4304-5204014		4304-5206014		4304-5209014	
0 to 100C	4304-5502514		4304-5504014		4304-5506014		4304-5509014	
−10 to 110C	4304-5302514		4304-5304014		4304-5306014		4304-5309014	
0 to 150C	4304-5602514		4304-5604014		4304-5606014		4304-5609014	
0 to 200C	4304-5702514		4304-5704014		4304-5706014		4304-5709014	
0 to 300C	4304-5902514		4304-5904014		4304-5906014		4304-5909014	
100 to 400C	4304-6002514	↓	4304-6004014	↓	4304-6006014	↓	4304-6009014	↓

Model 4304

Range	12" Stem Length		18" Stem Length		24" Stem Length	
	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price
−100 to 100F	4304-1012014	$31.00	4304-1018014	$33.00	4304-1024014	$35.00
−40 to 120F	4304-1212014		4304-1218014		4304-1224014	
25 to 125F	4304-2012014		4304-2018014		4304-2024014	
0 to 200F	4304-1612014		4304-1618014		4304-1624014	
20 to 240F	4304-1912014		4304-1918014		4304-1924014	
50 to 300F	4304-2312014		4304-2318014		4304-2324014	
50 to 400F	4304-2412014		4304-2418014		4304-2424014	
50 to 500F	4304-2512014		4304-2518014		4304-2524014	
150 to 750F	4304-2612014		4304-2618014		4304-2624014	
200 to 1000F*	4304-2812014		4304-2818014		4304-2824014	
−100 to 50C	4304-5012014		4304-5018014		4304-5024014	
0 to 50C	4304-5412014		4304-5418014		4304-5424014	
−50 to 100C	4304-5212014		4304-5218014		4304-5224014	
0 to 100C	4304-5512014		4304-5518014		4304-5524014	
−10 to 110C	4304-5312014		4304-5318014		4304-5324014	
0 to 150C	4304-5612014		4304-5618014		4304-5624014	
0 to 200C	4304-5712014		4304-5718014		4304-5724014	
0 to 300C	4304-5912014		4304-5918014		4304-5924014	
100 to 400C	4304-6012014	↓	4304-6018014	↓	4304-6024014	↓

*Not recommended for continuous operation above 800°F.

NOTE: Prices are for Thermometers with fixed connection ½" NPT.
They are also available with union connection ½" NPT —
Add $3.00 net surcharge.

"s" Normally carried in stock. Do not include "s" in your order write up.

5" STANDARD INDUSTRIAL THERMOMETERS

Model 4503 (Back Connected – Angle Form)

Range	2½" Stem Length		4" Stem Length		6" Stem Length		9" Stem Length	
	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price
–100 to 100F	4503-0020500	$22.75	4503-0020501	$22.25	4503-0020502	$22.25	4503-0020503	$24.00
–40 to 120F	4503-0020507	↓	4503-0020508 s	↓	4503-0020509 s	↓	4503-0020510s	↓
25 to 125F	4503-0020514		4503-0020515 s		4503-0020516s		4503-0020517s	
0 to 200F	4503-0020521s		4503-0020522 s		4503-0020523s		4503-0020524s	
20 to 240F	4503-0020528s		4503-0020529 s		4503-0020530 s		4503-0020531s	
50 to 300F	4503-0020535s		4503-0020536 s		4503-0020537s		4503-0020538s	
50 to 400F	4503-0020542		4503-0020543 s		4503-0020544s		4503-0020545s	
50 to 500F	4503-0020612		4503-0020613 s		4503-0020614s		4503-0020615s	
150 to 750F	4503-0020549		4503-0020550 s		4503-0020551s		4503-0020552s	
200 to 1000F*	4503-0020556		4503-0020557		4503-0020558s		4503-0020559s	
–100 to 50C	4503-0020563		4503-0020564		4503-0020565		4503-0020566	
0 to 50C	4503-0020570		4503-0020571		4503-0020572		4503-0020573	
–50 to 100C	4503-0020577		4503-0020578		4503-0020579		4503-0020580	
0 to 100C	4503-0020584		4503-0020585 s		4503-0020586s		4503-0020587	
–10 to 110C	4503-0020591		4503-0020592		4503-0020593s		4503-0020594	
0 to 150C	4503-0020605		4503-0020606 s		4503-0020607s		4503-0020608	
0 to 200C	4503-0020619		4503-0020620 s		4503-0020621		4503-0020622	
0 to 300C	4503-0020626		4503-0020627		4503-0020628		4503-0020629	
100 to 400C	4502-0020598		4503-0020599		4503-0020600		4503-0020601	

Model 4503 (Back Connected – Angle Form)

Range	12" Stem Length		18" Stem Length		24" Stem Length	
	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price
–100 to 100F	4503-0020504	$24.00	4503-0020505	$27.00	4503-0020506	$29.00
–40 to 120F	4503-0020511s	↓	4503-0020512	↓	4503-0020513	↓
25 to 125F	4503-0020518		4503-0020519		4503-0020520	
0 to 200F	4503-0020525s		4503-0020526		4503-0020527	
20 to 240F	4503-0020532s		4503-0020533		4503-0020534	
50 to 300F	4503-0020539s		4503-0020540		4503-0020541	
50 to 400F	4503-0020546s		4503-0020547		4503-0020548	
50 to 500F	4503-0020616s		4503-0020617		4503-0020618	
150 to 750F	4503-0020553s		4503-0020554		4503-0020555	
200 to 1000F*	4503-0020560s		4503-0020561		4503-0020562	
–100 to 50C	4503-0020567		4503-0020568		4503-0020569	
0 to 50C	4503-0020574		4503-0020575		4503-0020576	
–50 to 100C	4503-0020581		4503-0020582		4503-0020583	
0 to 100C	4503-0020588		4503-0020589		4503-0020590	
–10 to 110C	4503-0020595		4503-0020596		4503-0020597	
0 to 150C	4503-0020609		4503-0020610		4503-0020611	
0 to 200C	4503-0020623		4503-0020624		4503-0020625	
0 to 300C	4503-0020630		4503-0020631		4503-0020632	
100 to 400C	4503-0020602		4503-0020603		4503-0020604	

*Not recommended for continuous operation above 800°F.

NOTE: Prices are for Thermometers with fixed connection ½" NPT. They are also available with union connection ½" NPT – Add $3.00 net surcharge.

"s" Normally carried in stock. Do not include "s" in your order write up.

5" STANDARD INDUSTRIAL THERMOMETERS (Cont'd.)

Model 4513 (Bottom Connected – Straight Form)

Range	2½" Stem Length		4" Stem Length		6" Stem Length		9" Stem Length	
	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price
–100 to 100F	4513-0020700	$33.50	4513-0020701	$33.00	4513-0020702	$33.00	4513-0020703	$35.00
–40 to 120F	4513-0020822		4513-0020819		4513-0020820		4513-0020823	
0 to 200F	4513-0020714s		4513-0020715s		4513-0020716s		4513-0020717s	
20 to 240F	4513-0020721s		4513-0020722s		4513-0020723s		4513-0020724s	
50 to 300F	4513-0020728s		4513-0020729s		4513-0020730s		4513-0020731	
50 to 400F	4513-0020735		4513-0020736s		4513-0020737s		4513-0020738	
50 to 500F	4513-0020742		4513-0020743s		4513-0020744s		4513-0020745	
150 to 750F	4513-0020749		4513-0020750		4513-0020751s		4513-0020752	
200 to 1000F*	4513-0020763		4513-0020764		4513-0020765		4513-0020766	
–100 to 50C	4513-0020770		4513-0020771		4513-0020772		4513-0020773	
–50 to 100C	4513-0020777		4513-0020778		4513-0020779		4513-0020780	
–10 to 110C	4513-0020791		4513-0020792		4513-0020793		4513-0020794	
0 to 100C	4513-0020798		4513-0020799		4513-0020800		4513-0020801	
0 to 150C	4513-0020805		4513-0020806		4513-0020807		4513-0020808	
0 to 200C	4513-0020812		4513-0020813		4513-0020814		4513-0020815	
0 to 300C	4513-0020784		4513-0020785		4513-0020786		4513-0020787	
100 to 400C	4513-0020756	↓	4513-0020757	↓	4513-0020758	↓	4513-0020759	↓

Model 4513 (Bottom Connected – Straight Form)

Range	12" Stem Length		18" Stem Length		24" Stem Length	
	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price
–100 to 100F	4513-0020704	$35.00	4513-0020705	$37.00	4513-0020706	$39.00
–40 to 120F	4513-0020824		4513-0020825		4513-0020821	
0 to 200F	4513-0020718		4513-0020719		4513-0020720	
20 to 24oF	4513-0020725		4513-0020726		4513-0020727	
50 to 300F	4513-0020732		4513-0020733		4513-0020734	
50 to 400F	4513-0020739		4513-0020740		4513-0020741	
50 to 500F	4513-0020746		4513-0020747		4513-0020748	
150 to 750F	4513-0020753		4513-0020754		4513-0020755	
200 to 1000F*	4513-0020767		4513-0020768		4513-0020769	
–100 to 50C	4513-0020774		4513-0020775		4513-0020776	
–50 to 100C	4513-0020781		4513-0020782		4513-0020783	
–10 to 110C	4513-0020795		4513-0020796		4513-0020797	
0 to 100C	4513-0020802		4513-0020803		4513-0020804	
0 to 150C	4513-0020809		4513-0020810		4513-0020811	
0 to 200C	4513-0020816		4513-0020817		4513-0020818	
0 to 300C	4513-0020788		4513-0020789		4513-0020790	
100 to 400C	4513-0020760	↓	4513-0020761	↓	4513-0020762	↓

*Not recommended for continuous operation above 800°F.

NOTE: Prices are for Thermometers with fixed connection ½" NPT. They are also available with union connection ½" NPT – Add $3.00 net surcharge.

"s" Normally carried in stock. Do not include "s" in your order write up.

5" UNIVERSAL ANGLE THERMOMETERS

Model 4504

Range	2½" Stem Length		4" Stem Length		6" Stem Length		9" Stem Length	
	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price
100 to 100F	4504-1002514	$34.00	4504-1004014	$34.00	4504-1006014	$34.00	4504-1009014	$36.00
–40 to 120F	4504-1202514		4504-1204014 s		4504-1206014 s		4504-1209014 s	
25 to 125F	4504-2002514		4504-2004014		4504-2006014 s		4504-2009014	
0 to 200F	4504-1602514		4504-1604014 s		4504-1606014 s		4504-1609014 s	
20 to 240F	4504-1902514 s		4504-1904014 s		4504-1906014 s		4504-1909014	
50 to 300F	4504-2302514		4504-2304014 s		4504-2306014 s		4504-2309014 s	
50 to 400F	4504-2402514		4504-2404014 s		4504-2406014 s		4504-2409014 s	
50 to 500F	4504-2502514		4504-2504014 s		4504-2506014 s		4504-2509014	
150 to 750F	4504-2702514		4504-2704014		4504-2706014		4504-2709014	
200 to 1000F*	4504-2802514		4504-2804014		4504-2806014		4504-2809014	
–100 to 50C	4504-5002514		4504-5004014		4504-5006014		4504-5009014	
0 to 50C	4504-5402514		4504-5404014		4504-5406014		4504-5409014	
–50 to 100C	4504-5202514		4504-5204014		4504-5206014		4504-5209014	
0 to 100C	4504-5502514		4504-5504014 s		4504-5506014 s		4504-5509014	
–10 to 110C	4504-5302514		4504-5304014		4504-5306014		4504-5309014	
0 to 150C	4504-5602514		4504-5604014		4504-5606014		4504-5609014	
0 to 200C	4504-5702514		4504-5704014		4504-5706014		4504-5709014	
0 to 300C	4504-5902514		4504-5904014 s		4504-5906014 s		4504-5909014	
100 to 400 C	4504-6002514		4504-6004014		4504-6006014		4504-6009014	

Model 4504

Range	12" Stem Length		18" Stem Length		24" Stem Length	
	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price
–100 to 100F	4504-1012014	$36.00	4504-1018014	$38.00	4504-1024014	$40.00
–40 to 120F	4504-1212014		4504-1218014		4504-1224014	
25 to 125F	4504-2012014		4504-2018014		4504-2024014	
0 to 200F	4504-1612014		4504-1618014		4504-1624014	
20 to 240F	4504-1912014		4504-1918014		4504-1924014	
50 to 300F	4504-2312014		4504-2318014		4504-2324014	
50 to 400F	4504-2412014		4504-2418014		4504-2424014	
50 to 500F	4504-2512014		4504-2518014		4504-2524014	
150 to 750F	4504-2712014		4504-2718014		4504-2724014	
200 to 1000F*	4504-2812014		4504-2818014		4504-2824014	
–100 to 50C	4504-5012014		4504-5018014		4504-5024014	
0 to 50C	4504-5412014		4504-5418014		4504-5424014	
–50 to 100C	4504-5212014		4504-5218014		4504-5224014	
0 to 100C	4504-5512014		4504-5518014		4504-5524014	
–10 to 110C	4504-5312014		4504-5318014		4504-5324014	
0 to 150C	4504-5612014		4504-5618014		4504-5624014	
0 to 200C	4504-5712014		4504-5718014		4504-5724014	
0 to 300C	4504-5912014		4504-5918014		4504-5924014	
100 to 400C	4504-6012014		4504-6018014		4504-6024014	

*Not recommended for continuous operation above 800°F.

NOTE: Prices are for Thermometers with fixed connection ½" NPT. They are also available with union connection ½" NPT – Add $3.00 net surcharge.

"s" Normally carried in stock. Do not include "s" in your order write up.

THERMOMETER WELLS

Model 9966
WELLS WITH LAGGING EXTENSION

Description	Dwg. No.	Price
Carbon steel ¾" NPT 6" stem	95332 s	$ 8.25
Brass ¾" NPT 6" stem	95441 s	8.25
304 s.s. ¾" NPT 6" stem	95335 s	11.00
316 s.s. ¾" NPT 6" stem	96134	13.75
Carbon steel 1" NPT 6" stem	95874	10.00
Brass 1" NPT 6" stem	95878	10.00
304 s.s. 1" NPT 6" stem	95877	14.25
316 s.s. 1" NPT 6" stem	96631	16.75
Carbon steel ¾" NPT 9" stem	95830	11.75
Brass ¾" NPT 9" stem	95834	11.75
304 s.s. ¾" NPT 9" stem	172764 s	16.50
316 s.s. ¾" NPT 9" stem	173310	19.75
Carbon steel 1" NPT 9" stem	96606	13.00
Brass 1" NPT 9" stem	96596	13.00
304 s.s. 1" NPT 9" stem	172768	19.50
316 s.s. 1" NPT 9" stem	173314	22.50
Carbon steel ¾" NPT 12" stem	95959	15.50
Brass ¾" NPT 12" stem	95956	15.50
304 s.s. ¾" NPT 12" stem	172765	20.50
316 s.s. ¾" NPT 12" stem	173311	25.00
Carbon steel 1" NPT 12" stem	96607	17.25
Brass 1" NPT 12" stem	96597	17.25
304 s.s. 1"NPT 12" stem	172769	23.25
316 s.s. 1"NPT 12" stem	173315	31.00
Carbon steel ¾" NPT 18" stem	95960	23.50
Brass ¾" NPT 18" stem	95957	23.50
304 s.s. ¾" NPT 18" stem	172766	33.25
316 s.s. ¾" NPT 18" stem	183312	42.00
Carbon steel 1" NPT 18" stem	96608	27.00
Brass 1" NPT 18" stem	96598	27.00
304 s.s. 1" NPT 18" stem	172770	38.00
316 s.s. 1" NPT 18" stem	173316	51.50
Carbon steel ¾" NPT 24" stem	95961	28.00
Brass ¾" NPT 24" stem	95958	28.00
304 s.s. ¾" NPT 24" stem	172767	46.75
316 s.s. ¾" NPT 24" stem	173313	54.00
Carbon steel 1" NPT 24" stem	96609	31.00
Brass 1" NPT 24" stem	96599	31.00
304 s.s. 1" NPT 24" stem	172771	51.25
316 s.s. 1" NPT 24" stem	173317	64.00

Model 9966
BUSHINGS WITH LAGGING EXTENSION

Description	Dwg. No.	Price
Carbon steel ¾" NPT	95976	$ 8.50
Brass ¾" NPT	95975	8.50
304 s.s. ¾" NPT	95977	10.50

Brass Cap And Chain (optional) At $1.50 Each Extra

Stainless Steel Cap And Chain (optional) At $3.75 Each Extra

Model 9966
WELLS WITHOUT LAGGING EXTENSION

Description	Dwg. No.	Price
Carbon steel 1" NPT 4" stem	95868	$ 8.25
Brass 1" NPT 4" stem	95872	8.25
304 s.s. 1" NPT 4" stem	95871s	11.50
316 s.s. 1" NPT 4" stem	96618	13.50
Carbon steel ¾" NPT 6" stem	95443s	8.25
Brass ¾" NPT 6" stem	95447s	8.25
304 s.s. ¾" NPT 6" stem	95446s	11.00
316 s.s. ¾" NPT 6" stem	96133	13.75
Carbon steel 1" NPT 6" stem	95880	10.00
Brass 1" NPT 6" stem	95884	10.00
304 s.s. 1" NPT 6" stem	95883s	14.00
316 s.s. 1" NPT 6" stem	96619	16.75
Carbon steel ¾" NPT 9" stem	96053s	11.75
Brass ¾" NPT 9" stem	96055	11.75
304 s.s. ¾" NPT 9" stem	172756s	16.50
316 s.s. ¾" NPT 9" stem	173302	19.75
Carbon steel 1" NPT 9" stem	96588	13.00
Brass 1" NPT 9" stem	96584	13.00
304 s.s. 1" NPT 9" stem	172760s	19.50
316 s.s. 1" NPT 9" stem	173306	22.50
Carbon steel ¾" NPT 12" stem	95948s	15.50
Brass ¾" NPT 12" stem	95945	15.50
304 s.s. ¾" NPT 12" stem	172757s	20.50
316 s.s. ¾" NPT 12" stem	173303	25.00
Carbon steel 1" NPT 12" stem	96589	17.25
Brass 1" NPT 12" stem	96585	17.25
304 s.s. 1" NPT 12" stem	172761	23.25
316 s.s. 1" NPT 12" stem	173307	31.00
Carbon steel ¾" NPT 18" stem	95949	23.50
Brass ¾" NPT 18" stem	95946	23.50
304 s.s. ¾" NPT 18" stem	172758s	33.25
316 s.s. ¾" NPT 18" stem	173304	42.00
Carbon steel 1" NPT 18" stem	96590	27.00
Brass 1" NPT 18" stem	96586	27.00
304 s.s. 1" NPT 18" stem	172762	38.00
316 s.s. 1" NPT 18" stem	173308	51.75
Carbon steel ¾" NPT 24" stem	95950s	28.00
Brass ¾" NPT 24" stem	95947	28.00
304 s.s. ¾" NPT 24" stem	172759s	46.75
316 s.s. ¾" NPT 24" stem	173305	54.00
Carbon steel 1" NPT 24" stem	96591	31.00
Brass 1" NPT 24" stem	96587	31.00
304 s.s. 1" NPT 24" stem	172763	51.25
316 s.s. 1" NPT 24" stem	173309	64.00
Carbon steel ¾" NPT 4" stem	95327s	7.00
Brass ¾" NPT 4" stem	95440s	7.00
304 s.s. ¾" NPT 4" stem	95330s	9.50
316 s.s. ¾" NPT 4" stem	96159s	11.50

Model 9966
BUSHINGS WITHOUT LAGGING EXTENSION

Description	Dwg. No.	Price
Carbon steel ¾" NPT	95981	$ 6.00
Brass ¾" NPT	95980	6.25
304 s.s.	95982	7.25

"s" Normally carried in stock. Do not include "s" in your order write up.

WESTON INSTRUMENTS DIVISION
WESTON INSTRUMENTS, INC.
614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
a Schlumberger company

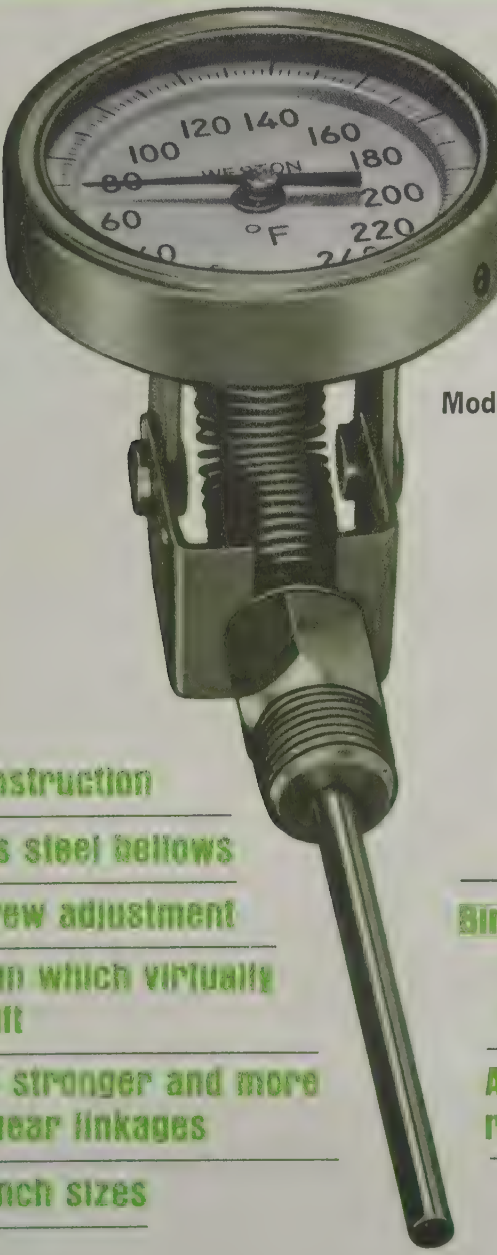
09-108 1/71 HH

Printed in U.S.A.

NEW!
FROM
WESTON

Universal Angle Thermometer*—Fully adjustable 3 inch (Model 4302) and 5 inch (Model 4502) universal angle thermometer. This unique, highly dependable thermometer can be mounted for viewing at *any angle* The dial can be twisted or tilted on the stem for ease of installation. This highly engineered thermometer offers a rare combination of features made possible through Weston's dedication to engineering detail, manufacturing care, and stringent quality control.

*Pat. Pend.



Model 4302

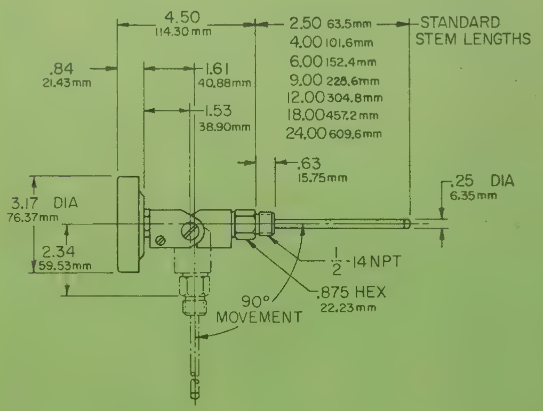
- **All stainless steel construction**
- **Heavy gauge stainless steel bellows**
- **A minimum of set screw adjustment**
- **A simple unique design which virtually eliminates pointer shift**
- **Pivoted yoke which is stronger and more rigid than eccentric gear linkages**
- **Available in 3 and 5 inch sizes**

- **External calibration**
- **Removable fronts**
- **Bimetal element designed to assure long term stability and accuracy**
- **Accuracy within ±1% of range over entire scale**
- **All Heliarc welded**

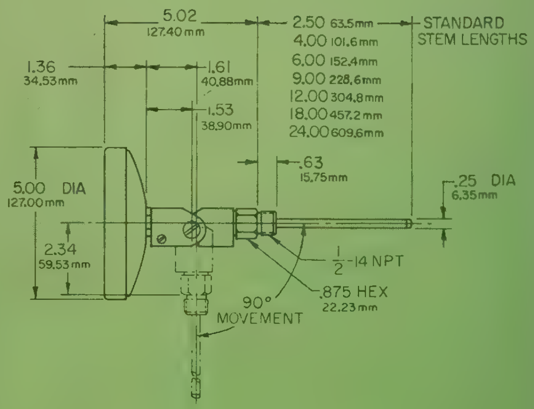
3 inch (Model 4302) and 5 inch (Model 4502) Universal Angle Thermometers

Range	°/Div	Range	°/Div
–100 to 100F	2	–100 to 50C	1
– 40 to 120F	1	0 to 50C	½
25 to 125F	1	– 50 to 100C	1
0 to 200F	2	0 to 100C	1
20 to 240F	2	– 10 to 110C	1
50 to 300F	2	0 to 150C	1
50 to 400F	5	0 to 200C	2
50 to 500F	5	0 to 300C	5
150 to 750F	10	100 to 400C	5
200 to 1000F*	10		

*Not recommended for continuous operation above 800 F.


4.50
114.30 mm
2.50 63.5mm
4.00 101.6mm
6.00 152.4mm
9.00 228.6mm
12.00 304.8mm
18.00 457.2mm
24.00 609.6mm
STANDARD STEM LENGTHS
.84
21.43mm
1.61
40.88mm
1.53
38.90mm
.63
15.75mm
.25 DIA
6.35mm
3.17 DIA
76.37mm
2.34
59.53mm
1/2-14 NPT
.875 HEX
22.23mm
90° MOVEMENT

Model 4302


5.02
127.40 mm
2.50 63.5mm
4.00 101.6mm
6.00 152.4mm
9.00 228.6mm
12.00 304.8mm
18.00 457.2mm
24.00 609.6mm
STANDARD STEM LENGTHS
1.36
34.53mm
1.61
40.88mm
1.53
38.90mm
.63
15.75mm
.25 DIA
6.35mm
5.00 DIA
127.00mm
2.34
59.53mm
1/2-14 NPT
.875 HEX
22.23mm
90° MOVEMENT

Model 4502

Model 4302	2½ to 24″ Stem	1 lb.	Model 4502	2½ to 24″ Stem	1.75 lbs.

All dimensions are approximate.

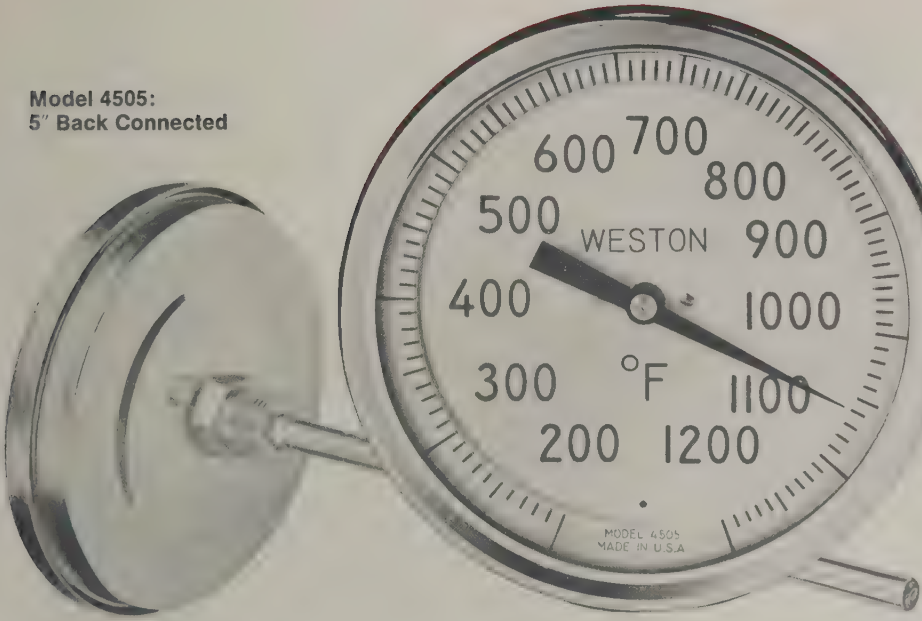
WESTON INSTRUMENTS, INC.
WESTON - NEWARK DIVISION
614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114

Printed in U.S.A.

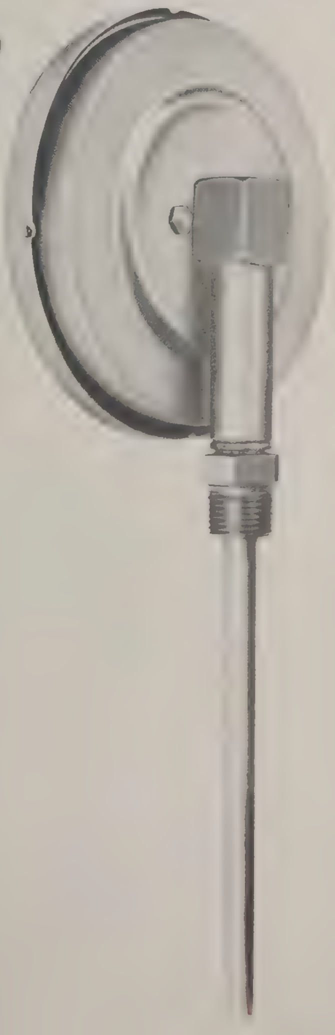
WESTON®

High Temperature Bimetal Thermometer

Model 4505:
5″ Back Connected



Model 4515:
5″ Bottom Connected



A bimetal thermometer that maintains its accuracy and stability for thousands of hours in the 850° to 1200°F temperature range—a first in the industry!

A unique and highly dependable thermometer with a range of 200° to 1200°F is designed for continuous duty even at 1200°F! And what's more this thermometer comes with a calibrating feature that can be adjusted in the field to better than ±2% of full scale value. In-line pointer and scale eliminates parallax error from any angle. This highly engineered thermometer offers a rare combination of features made possible through Weston's dedication to engineering detail, manufacturing care, and stringent quality control.

FEATURES

Continuous duty at 1200°F
External calibration
Stem lengths from 4″, 6″, 9″, 12″, 18″, 24″
Improved sealing
3″ and 5″ Heads—Bottom and back connected
All stainless steel construction
Easy-to-read dial
Improved corrosion resistance
Improved vibration and shock resistance

SPECIFICATIONS

Head: Models 4305/4315 3″ diameter and Models 4505/4515 5″ diameter, with stainless steel cases and bezels. Heavy glass windows provide high resistance to breakage. Equipped with special gasket material which protects against breathing and leakage under outdoor environmental conditions and low temperature service without fogging or freeze-up. Even with external changes in temperature "no breathing" action takes place, thus providing the maximum protection for the internal parts of the instrument.

Scale and Pointer: In-line scale and pointer provide accurate readings at any eye level. Metal scale plate with permanent black figures and markings. Pointers are damped against excessive movement in the presence of vibration.

Models 4305/4315 scale lengths are 6″ and Models 4505/4515 are 10″.

Stem: 18-8 Type 304 Stainless Steel, ⅜″ diameter. Standard lengths are 4″, 6″, 9″, 12″, 18″ and 24″.

All stainless steel welds are used at both plug and case ends of the stem, thus providing high resistance to corrosion.

Approximate Weight: ½ lb.

Connection Nut: 18-8 stainless steel threaded ½″ N.P.T., is standard. Can be supplied with ¾″ N.P.T. at a surcharge.

Immersion: For correct temperature indications the stem should be at least 2″ in liquids and 4″ in gases.

Accuracy: Within ±2% of range over entire scale.

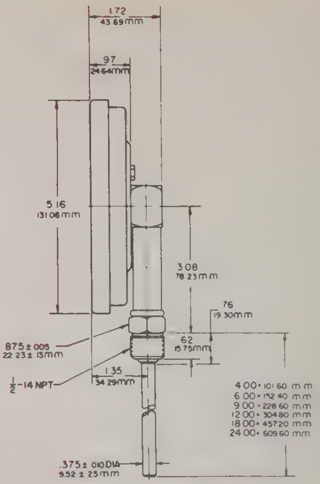
Adjustment: A small HEX nut located on the back of the case is available to rotate the scale 360°. Recalibration is performed by placing the stem in a liquid of known temperature and turning the adjusting nut until the scale indication agrees with the bath temperature.

Model	Range	Div.	Size	Configuration
4305	200/1200°F	10	3″	Back Connected
4315	200/1200°F	10	3″	Bottom Connected
4515	200/1200°F	10	5″	Bottom Connected
4505	200/1200°F	10	5″	Back Connected

LIST PRICES

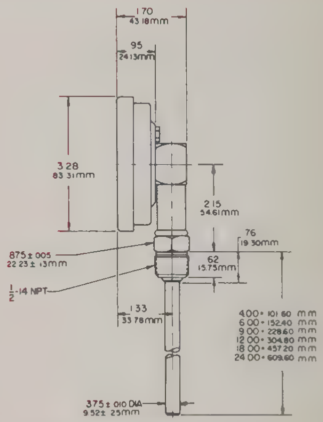
STEM LENGTH	CATALOG NUMBER	MODEL 4305	CATALOG NUMBER	MODEL 4315	CATALOG NUMBER	MODEL 4505	CATALOG NUMBER	MODED 4515
4″	0012004	$93.25	0012004	$97.25	0012004	$98.25	0012004	$103.00
6″	0012006	94.25	0012006	97.95	0012006	98.25	0012006	103.00
9″	0012009	95.00	0012009	100.00	0012009	101.00	0012009	105.00
12″	0012012	95.00	0012012	100.00	0012012	101.00	0012012	105.00
18″	0012018	96.75	0012018	101.75	0012018	102.75	0012018	106.75
24″	0012024	98.75	0012024	101.75	0012024	102.75	0012024	106.75

Be sure to include Model AND Catalog Numbers when ordering (i.e. — 4305 — 0012004; 4515 — 0012018).



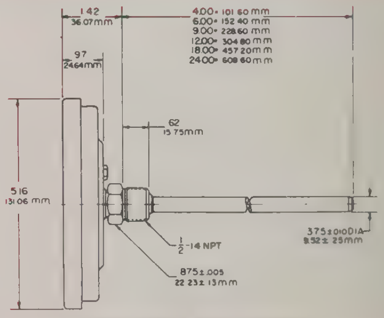
1.72
43.69mm
.97
24.64mm
5.16
131.06mm
3.08
78.23mm
.76
19.30mm
.62
15.75mm
.875 ± .005
22.23 ± .13mm
½-14 NPT
1.35
34.29mm
4.00 · 101.60 mm
6.00 · 152.40 mm
9.00 · 228.60 mm
12.00 · 304.80 mm
18.00 · 457.20 mm
24.00 · 609.60 mm
.375 ± .010 DIA
9.52 ± .25mm

Model 4515: 5″ Bottom Connected



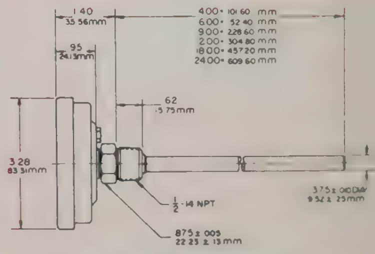
1.70
43.18mm
.95
24.13mm
3.28
83.31mm
2.15
54.61mm
.76
19.30mm
.875 ± .005
22.23 ± .13mm
.62
15.75mm
½-14 NPT
1.33
33.78mm
4.00 · 101.60 mm
6.00 · 152.40 mm
9.00 · 228.60 mm
12.00 · 304.80 mm
18.00 · 457.20 mm
24.00 · 609.60 mm
.375 ± .010 DIA
9.52 ± .25mm

Model 4315: 3″ Bottom Connected



1.42
36.07mm
4.00 · 101.60 mm
6.00 · 152.40 mm
9.00 · 228.60 mm
12.00 · 304.80 mm
18.00 · 457.20 mm
24.00 · 608.60 mm
.97
24.64mm
.62
15.75mm
5.16
131.06 mm
.375 ± .010 DIA
9.52 ± .25mm
½-14 NPT
.875 ± .005
22.23 ± .13mm

Model 4505: 5″ Back Connected



1.40
35.56mm
4.00 · 101.60 mm
6.00 · 52.40 mm
9.00 · 228.60 mm
2.00 · 304.80 mm
18.00 · 457.20 mm
24.00 · 609.60 mm
.95
24.13mm
.62
15.75mm
3.28
83.31mm
½-14 NPT
.375 ± .010 DIA
9.52 ± .25mm
.875 ± .005
22.23 ± .13mm

Model 4305: 3″ Back Connected

WESTON INSTRUMENTS DIVISION
WESTON INSTRUMENTS, INC.
614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
a Schlumberger company

Circular 09-110—A
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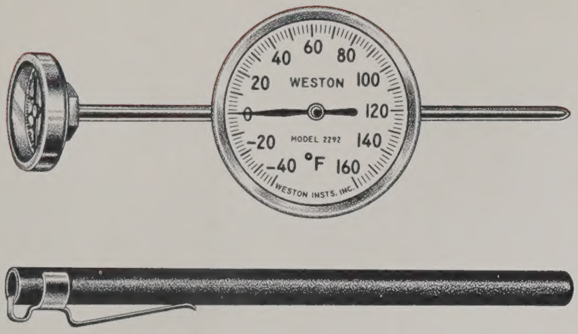
Printed in USA

WESTON®

Pocket Thermometer

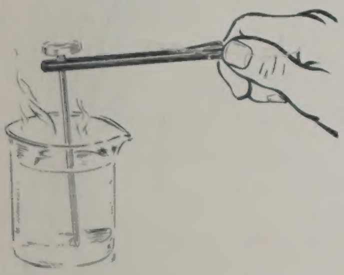
MODEL 2292



The thermometer can be recalibrated without disassembly by firmly holding the head and immersing the stem at least 2″ in an agitated known controlled temperature bath and turning the hex nut until the pointer indicates the correct temperature.

Head: 1″ diameter, 18-8 stainless steel, case and bezel. Plastic window is standard. If head temperature exceeds 220°F a glass window can be supplied at a surcharge. Metal scale plate with permanent black figures and markings.

Immersion: For correct indications the stem should be immersed at least 2″ in liquids and 4″ in gases.



Note a small loop on the clip at the end of the black pocket case provided with the thermometer. By inserting the stem through the loop, the case becomes a convenient handle for immersing the thermometer in liquids and avoids possible burns or loss of thermometer.

Ideal for spot checking by inspectors, foremen, operators in various industries such as heating, ventilating, chemical and oil. Supplied with a hard rubber carrying case with an attached pocket clip.

Stem: 5″ spiked, (For easy insertion into meat, food packages or any semi-solid materials) 18-8 Type 304 stainless steel, .142″ diameter.

Scale Length: 2.1 inches.
Accuracy: Within ½% of range over entire scale.

RANGE	°/DIV.	RANGE	°/DIV.	RANGE	°/DIV.
−40 to 160 F	2	0 to 220 F	2	0 to 150 C	2
25 to 125 F	1	50 to 500 F	5	0 to 250 C	5

Approximate Weight . . . . 1 oz.

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Standards Lab

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